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THE UNIVERSITY OF ALBERTA

THE TAXONOMY AND DISTRIBUTION OF THE ASILIDAE  
(DIPTERA) OF ALBERTA

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES  
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE  
OF MASTER OF SCIENCE

DEPARTMENT OF ENTOMOLOGY

by

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EDMONTON, ALBERTA

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UNIVERSITY OF ALBERTA  
FACULTY OF GRADUATE STUDIES

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled "The Taxonomy and Distribution of the Asilidae (Diptera) of Alberta", submitted by Soenartono Adisoemarto in partial fulfilment of the requirements for the degree of Master of Science.





## ABSTRACT

A taxonomic treatment is presented for the adults of 85 species of Asilidae. Brief notes on their ecological relationships and habitats are also presented. In the discussion of the morphology of the adults, the description and definition of the morphological characters used in the text are presented.

Strickland (1938; 1946) included 66 species in his lists. The following 19 species, eight of them new, are added to the list: Lasiopogon trivittatus Melander, Lasiopogon prima new species, Lasiopogon hinei Cole and Wilcox, Lasiopogon canus Cole and Wilcox, Holopogon nigripilosa new species, Heteropogon wilcoxi James, Cyrtopogon aurifex Osten-Sacken, Cyrtopogon inversus Curran, Cyrtopogon distinctitarsus new species, Cyrtopogon glarealis Melander, Eucyrtopogon incompletus new species, Pogonosoma stricklandi new species, Laphria scorpio McAtee, Laphria index McAtee, Leptogaster aridus Cole, Leptogaster coloradensis James, Asilus aridalis new species, Asilus gramalis new species, and Asilus cumbipilosus new species.



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## LIST OF FIGURES

1. Map of localities in Alberta, where species of Asilidae have been collected.
2. Stichopogon argenteus Say; head, lateral aspect.
3. Stichopogon trifasciatus Say; head, lateral aspect.
4. Stichopogon trifasciatus Say; head, dorsal aspect.
5. Lasiopogon terricola Johnson; head, lateral aspect.
6. Lasiopogon terricola Johnson; head, anterior aspect.
7. Lasiopogon terricola Johnson; head, dorsal aspect.
8. Lasiopogon cinereus Cole; head, lateral aspect.
9. Lasiopogon cinereus Cole; head, dorsal aspect.
10. Ospriocerus abdominalis Say; head, lateral aspect.
11. Stenopogon coyote Bromley; head, lateral aspect.
12. Stenopogon obscuriventris Loew; head; lateral aspect.
13. Stenopogon inquinatus Loew; head, lateral aspect.
14. Stenopogon inquinatus Loew; head, anterior aspect.
15. Stenopogon inquinatus Loew; dorsal aspect.
16. Holopogon albipilosus Curran; head, lateral aspect.
17. Holopogon albipilosus Curran; head, anterior aspect.
18. Cyrtopogon distinctitarsus new species; head, lateral aspect.
19. Cyrtopogon distinctitarsus new species; head, anterior aspect.
20. Nicocles utahensis Melander; head, lateral aspect.
21. Nicocles utahensis Melander; head; anterior aspect.
22. Nicocles utahensis Melander; head, dorsal aspect.
23. Pogonosoma stricklandi new species; head, lateral aspect.
24. Pogonosoma stricklandi new species; head, anterior aspect.
25. Laphria scorpio McAtee; head, lateral aspect.
26. Proctacanthella cacopiloga Hine; head, lateral aspect.





27. Nerax bicaudatus Hine; head, lateral aspect.
28. Nerax bicaudatus Hine; head, anterior aspect.
29. Asilus callidus Williston; labrum-epipharynx, ventral aspect.
30. Cross-section of proboscis.
31. Asilus callidus Williston; hypopharynx, dorsal aspect.
32. Asilus callidus Williston; hypopharynx, ventral rod.
33. Asilus callidus Williston; hypopharynx, lateral rod.
34. Asilus callidus Williston; maxillary blade.
35. Asilus callidus Williston; maxillae and labium, ventral aspect.
36. Asilus callidus Williston; palpus, inner side aspect.
37. Asilus callidus Williston; labium, dorsal aspect.
38. Laphria janus McAtee; apical part of labium, ventral aspect.
39. Stichopogon trifasciatus Say; cardostipites and palpi, ventral aspect.
40. Lasiopogon cinereus Cole; cardostipites and palpi, ventral aspect.
41. Leptogaster aridus Cole; head, lateral aspect.
42. Stenopogon obscuriventris Loew; palpus.
43. Eucyrtopogon incompletus new species; palpus.
44. Nicocles utahensis Melander; palpus.
45. Heteropogon wilcoxi James; palpus.
46. Leptogaster aridus Cole; palpus.
47. Pogonosoma stricklandi new species; palpus.
48. Asilus callidus Williston; head, lateral aspect.
49. Asilus callidus Williston; head, frontal aspect.
50. Asilus callidus Williston; head, dorsal aspect.
51. Asilus callidus Williston; thorax, lateral aspect.
52. Asilus callidus Williston; thorax, dorsal aspect.
53. Asilus callidus Williston; prothorax, frontal aspect.



54. Stenopogon neglectus Bromley; prothorax, frontal aspect.
55. Stenopogon neglectus Bromley; prothorax, dorsal aspect.
56. Stichopogon trifasciatus Say; thorax, dorsal aspect.
57. Lasiopogon cinereus Cole; A. Wing venation; B. Wing cells.
58. Lestomyia sabulorum Osten-Sacken; male genitalia; A. lateral aspect.  
B. dorsal aspect; C. ventral aspect; D. aedeagus, a. dorsal aspect,  
b. lateral aspect; E. clasper, lateral aspect.
59. Lasiopogon quadrivittatus Jones; male genitalia, dorsal aspect;  
a. aedeagus, lateral aspect; b. hypandrial process, lateral aspect.
60. Stenopogon inquinatus Loew; proboscis, lateral aspect.
61. Eucyrtopogon incompletus new species; proboscis, lateral aspect.
62. Pogonosoma stricklandi new species; proboscis, lateral aspect.
63. Laphria xanthippe Williston; proboscis, lateral aspect.
64. Leptogaster aridus Cole; proboscis, lateral aspect.
65. Stichopogon trifasciatus Say; prothorax, frontal aspect.
66. Lasiopogon cinereus Cole; prothorax, frontal aspect.
67. Lasiopogon trivittatus Melander; scutellum, dorsal aspect.
68. Lasiopogon ripicola Melander; scutellum, dorsal aspect.
69. Proctacanthella cacopiloga Hine; scutellum, dorsal aspect.
70. Nerax bicaudatus Hine; scutellum, dorsal aspect.
71. Asilus paropus Walker; scutellum, dorsal aspect.
72. Asilus callidus Williston; scutellum, dorsal aspect.
73. Negasilus belli Curran; scutellum, dorsal aspect.
74. Lasiopogon quadrivittatus Jones; hind leg, lateral aspect.
75. Nicocles utahensis Melander; front tibia and tarsus, lateral aspect.
76. Nicocles utahensis Melander; hind tibia and tarsus, lateral aspect.
77. Comantella fallei Back; front tibia and tarsus, lateral aspect.





78. Cyrtopogon auratus Cole; front tibia and tarsus, dorsal aspect.
79. Cyrtopogon auripilosus Wilcox and Martin; hind leg, lateral aspect.
80. Cyrtopogon willistoni Curran; middle tarsus, dorsal aspect.
81. Cyrtopogon lineotarsus Curran; front tibia and tarsus, lateral aspect.
82. Asilus paropus Walker; front femur, lateral aspect.
83. Asilus snowi Hine; front femur, lateral aspect.
84. Holopogon albipilosus Curran; hind leg, lateral aspect.
85. Leptogaster aridus Cole; hind leg, lateral aspect.
86. Leptogaster aridus Cole; last tarsal segment, ventral aspect.
87. Stichopogon trifasciatus Say; abdomen, dorsal aspect.
88. Lasiopogon quadrivittatus Jones; abdomen, dorsal aspect.
89. Stenopogon iniquatus Loew; eighth abdominal segment and ovipositor,  
dorsal aspect.
90. Stenopogon iniquatus Loew; eighth abdominal segment and ovipositor,  
lateral aspect.
91. Stenopogon iniquatus Loew; eighth abdominal segment and ovipositor,  
ventral aspect.
92. Stenopogon iniquatus Loew; acanthophorite, posterior aspect.
93. Stenopogon iniquatus Loew; male genitalia and last two abdominal segments,  
lateral aspect.
94. Nicocles utahensis Melander; abdomen of male, dorsal aspect.
95. Nicocles utahensis Melander; abdomen of male, lateral aspect.
96. Nicocles utahensis Melander; abdomen of female, dorsal aspect.
97. Cyrtopogon auratus Cole; last four abdominal segments of male, dorsal aspect.
98. Cyrtopogon auratus Cole; last four abdominal segments of male, lateral aspect.
99. Laphria scorio McAtee; sixth and seventh abdominal segments of male, dorsal  
aspect.





100. Laphria scorio McAtee; sixth and seventh abdominal segments of male, lateral aspect.
101. Laphria janus McAtee; abdomen of female, dorsal aspect.
102. Leptogaster aridus Cole; abdomen of female, lateral aspect.
103. Leptogaster aridus Cole; first two abdominal segments, dorsal aspect.
104. Asilus callidus Williston; abdomen of female, dorsal aspect.
105. Asilus callidus Williston; first three abdominal segments, lateral aspect.
106. Lasiopogon aldrichi Melander; ovipositor, lateral aspect; specimen from Grant Co., Oregon.
107. Lasiopogon aldrichi Melander; ovipositor, lateral aspect; specimen from Drumheller, Alberta.
108. Laphria xanthippe Williston; ovipositor, dorsal aspect.
109. Laphria xanthippe Williston; ovipositor, ventral aspect.
110. Laphria xanthippe Williston; ovipositor, lateral aspect.
111. Pogonosoma ridingsi Cresson; ovipositor, ventral aspect.
112. Promachus dimidiatus Curran; ovipositor, lateral aspect.
113. Proctacanthella cacopiloga Hine; ovipositor, lateral aspect.
114. Nerax bicaudatus Hine; ovipositor, lateral aspect.
115. Asilus occidentalis Hine; posterior abdomen of male, lateral aspect.
116. Asilus occidentalis Hine; posterior abdomen of male, ventral aspect.
117. Asilus callidus Williston; ovipositor, lateral aspect.
118. Lasiopogon cinereus Cole; antenna.
119. Lasiopogon prima new species; antenna.
120. Lasiopogon aldrichi Melander; antenna; specimen from Grant Co., Oregon.
121. Lasiopogon aldrichi Melander; antenna; specimen from Drumheller, Alberta.
122. Ospricerus consanguineus Loew; antenna.
123. Ospricerus consanguineus Loew; antennal third segment, inner side aspect.



124. Ospriocerus abdominalis Say; antenna.
125. Ospriocerus abdominalis Say; antennal third segment, inner side aspect.
126. Stenopogon iniquatus Loew; antennal third segment, inner side aspect.
127. Holopogon albipilosus Curran; antenna.
128. Lestomyia sabulorum Osten-Sacken; antenna.
129. Nicocles utahensis Melander; antenna.
130. Heteropogon wilcoxi James; antenna.
131. Eucyrtopogon incompletus new species; antenna.
132. Pogonosoma stricklandi new species; antenna.
133. Laphria xanthippe Williston; antenna.
134. Laphria xanthippe Williston; antennal third segment, inner side aspect.
135. Laphria xanthippe Williston; antennal first two segments, dorsal aspect.
136. Laphria sedales Walker; antenna.
137. Laphria scorio McAtee; antenna.
138. Laphria aeatus Walker; antenna.
139. Leptogaster aridus Cole; antenna.
140. Proctacanthella cacopiloga Hine; antenna.
141. Nerax bicaudatus Hine; antenna.
142. Asilus delusus Tucker; antenna.
143. Asilus paropus Walker; antenna.
144. Asilus erythocnemius Hine; antenna.
145. Asilus aridalis new species; antenna.
146. Asilus gramalis new species; antenna.
147. Negasilus belli Curran; antenna.
148. Lasiopogon prima new species; wing.
149. Lasiopogon prima new species; wing, cf. second and third longitudinal veins.
150. Stenopogon coyote Bromley; wing.





151. Stenopogon coyote Bromley; wing, cf. first posterior cell.
152. Holopogon nigripilosa new species; wing.
153. Heteropogon wilcoxi James; wing.
154. Lestomyia sabulorum Osten-Sacken; wing.
155. Cyrtopogon bimacula Walker; wing.
156. Cyrtopogon distinctitarsus new species; wing.
157. Cyrtopogon dasyllis Williston; wing.
158. Eucyrtopogon comantis Curran; wing.
159. Eucyrtopogon diversipilosus Curran; wing.
160. Pogonosoma stricklandi new species; wing.
161. Laphria xanthippe Williston; wing.
162. Laphria janus McAtee; wing.
163. Leptogaster aridus Cole; wing.
164. Promachus dimidiatus Curran; wing.
165. Nerax bicaudatus Hine; wing.
166. Nerax canus Hine; wing.
167. Nerax subcupreus Schaeffer; wing.
168. Nerax costalis Williston; wing.
169. Asilus nitidifacies Hine; wing.
170. Lasiopogon terricola Johnson; male genitalia, lateral aspect.
171. Lasiopogon terricola Johnson; a. hypandrium, dorsal aspect;  
b. hypandrial process, lateral aspect.
172. Lasiopogon terricola Johnson; superior forceps, ventral aspect.
173. Lasiopogon terricola Johnson; proctiger, dorsal aspect.
174. Lasiopogon terricola Johnson; aedeagus, a. dorsal aspect, b. lateral aspect.
175. Lasiopogon trivittatus Melander; male genitalia, lateral aspect.
176. Lasiopogon trivittatus Melander; a. hypandrium, dorsal aspect; b. hypandrial  
process, lateral aspect.



177. Lasiopogon trivittatus Melander; superior forceps, ventral aspect.
178. Lasiopogon trivittatus Melander; proctiger, dorsal aspect.
179. Lasiopogon trivittatus Melander; aedeagus, a. dorsal aspect, b. lateral aspect.
180. Lasiopogon cinereus Cole; male genitalia, lateral aspect.
181. Lasiopogon cinereus Cole; a. hypandrium, dorsal aspect; b. hypandrial process, lateral aspect.
182. Lasiopogon cinereus Cole; superior forceps, ventral aspect.
183. Lasiopogon cinereus Cole; proctiger, dorsal aspect.
184. Lasiopogon cinereus Cole; aedeagus, a. dorsal aspect, b. lateral aspect.
185. Lasiopogon prima new species; male genitalia, lateral aspect.
186. Lasiopogon prima new species; a. hypandrium, dorsal aspect; b. hypandrial process, lateral aspect.
187. Lasiopogon prima new species; superior forceps, ventral aspect.
188. Lasiopogon prima new species; proctiger, dorsal aspect.
189. Lasiopogon prima new species; aedeagus, a. dorsal aspect, b. lateral aspect.
190. Ospricerus consanguineus Loew; male genitalia, lateral aspect.
191. Ospricerus consanguineus Loew; hypandrium, ventral aspect.
192. Ospricerus consanguineus Loew; gonopod, dorsal aspect.
193. Ospricerus consanguineus Loew; aedeagus, a. dorsal aspect, b. lateral aspect.
194. Stenopogon obscuriventris Loew; male genitalia, lateral aspect.
195. Stenopogon obscuriventris Loew; hypandrium, ventral aspect.
196. Stenopogon obscuriventris Loew; superior forceps, a. dorsal aspect. b. posterior aspect.
197. Stenopogon obscuriventris Loew; gonopod, a. dorsal aspect, b. posterior aspect.
198. Stenopogon obscuriventris Loew; aedeagus, a. dorsal aspect, b. lateral aspect.
199. Stenopogon rufibarbis Bromley; male genitalia, lateral aspect.
200. Stenopogon rufibarbis Bromley; hypandrium, ventral aspect.





201. Stenopogon rufibarbis Bromley; superior forceps, a. dorsal aspect,  
b. posterior aspect.
202. Stenopogon rufibarbis Bromley; gonopod, a. dorsal aspect, b. posterior aspect.
203. Stenopogon rufibarbis Bromley; aedeagus, a. dorsal aspect, b. lateral aspect.
204. Stenopogon gratus Loew; male genitalia, lateral aspect.
205. Stenopogon gratus Loew; hypandrium, ventral aspect.
206. Stenopogon gratus Loew; gonopod, dorsal aspect.
207. Stenopogon gratus Loew; aedeagus, a. dorsal aspect, b. lateral aspect.
208. Stenopogon inquinatus Loew; male genitalia, lateral aspect, a. clasper,  
lateral aspect.
209. Stenopogon inquinatus Loew; hypandrium and gonopods, ventral aspect.
210. Stenopogon inquinatus Loew; superior forceps, dorsal aspects.
211. Stenopogon inquinatus Loew; proctiger, ventral aspect.
212. Stenopogon inquinatus Loew; aedeagus, a. dorsal aspect, b. lateral aspect.
213. Stenopogon neglectus Bromley; male genitalia, lateral aspect.
214. Stenopogon neglectus Bromley; hypandrium and gonopods, ventral aspect.
215. Stenopogon neglectus Bromley; superior forceps, dorsal aspect.
216. Stenopogon neglectus Bromley; proctiger, ventral aspect.
217. Stenopogon neglectus Bromley; aedeagus, a. dorsal aspect, b. lateral aspect.
218. Holopogon albipilosa Curran; male genitalia, lateral aspect.
219. Holopogon albipilosa Curran; male genitalia, dorsal aspect.
220. Holopogon albipilosa Curran; hypandrium and gonopods, ventral aspect.
221. Holopogon albipilosa Curran; aedeagus, a. lateral aspect, b. dorsal aspect.
222. Heteropogon wilcoxi James; male genitalia, lateral aspect.
223. Heteropogon wilcoxi James; gonopod, dorsal aspect.
224. Heteropogon wilcoxi James; hypandrium, ventral aspect.
225. Heteropogon wilcoxi James; aedeagus, a. dorsal aspect, b. lateral aspect.





226. Cyrtopogon auratus Cole; male genitalia, lateral aspect.
227. Cyrtopogon auratus Cole; superior forceps, dorsal aspect.
228. Cyrtopogon auratus Cole; hypandrium and gonopods, ventral aspect.
229. Cyrtopogon auratus Cole; aedeagus, a. dorsal aspect, b. lateral aspect.
230. Cyrtopogon montanus Williston; male genitalia, lateral aspect.
231. Cyrtopogon montanus Williston; superior forceps, dorsal aspect.
232. Cyrtopogon montanus Williston; hypandrium and gonopods, ventral aspect.
233. Cyrtopogon montanus Williston; aedeagus, a. dorsal aspect, b. lateral aspect.
234. Cyrtopogon dasyllis Williston; male genitalia, lateral aspect.
235. Cyrtopogon dasyllis Williston; superior forceps, dorsal aspect.
236. Cyrtopogon dasyllis Williston; hypandrium and gonopods, ventral aspect.
237. Cyrtopogon dasyllis Willison; aedeagus, a. dorsal aspect, b. lateral aspect.
238. Eucyrtopogon albibarbis Curran; male genitalia, lateral aspect.
239. Eucyrtopogon albibarbis Curran; superior forceps, dorsal aspect.
240. Eucyrtopogon albibarbis Curran; superior forceps, ventral aspect.
241. Eucyrtopogon albibarbis Curran; male genitalia ventral aspect.
242. Eucyrtopogon albibarbis Curran; aedeagus, a. dorsal aspect, b. lateral aspect.
243. Comantella fallei Back; male genitalia, lateral aspect.
244. Comantella fallei Back; superior forceps, dorsal aspect.
245. Comantella fallei Back; superior forceps, ventral aspect.
246. Comantella fallei Back; male genitalia, ventral aspect.
247. Comantella fallei Back; aedeagus, a. dorsal aspect, b. lateral aspect.
248. Laphria xanthippe Williston; male genitalia, lateral aspect.
249. Laphria xanthippe Williston; epandrium and proctiger, ventral aspect,  
a. proctiger, dorsal aspect.
250. Laphria xanthippe Williston; male genitalia, dorsal aspect.
251. Laphria xanthippe Williston; clasper and pseudoclasper, lateral aspect.



252. Laphria xanthippe Williston; aedeagus, a. dorsal aspect, b. lateral aspect.
253. Laphria scorio McAtee; male genitalia, lateral aspect; a. tip of gonopod, inner side aspect.
254. Laphria scorio McAtee; epandrium and proctiger, ventral aspect.
255. Laphria scorio McAtee; male genitalia, dorsal aspect.
256. Laphria scorio McAtee; pseudoclasper, lateral aspect.
257. Laphria scorio McAtee; clasper, lateral aspect.
258. Laphria scorio McAtee; aedeagus, a. dorsal aspect, b. lateral aspect.
259. Laphria aimatis McAtee; gonopod, dorsal aspect.
260. Laphria gilva Linnaeus; gonopod, dorsal aspect.
261. Laphria janus McAtee; pseudoclasper, lateral aspect.
262. Laphria vultur Osten-Sacken; pseudoclasper, lateral aspect.
263. Laphria sackeni Wilcox; pseudoclasper, lateral aspect.
264. Bombomima partitor Banks; male genitalia, lateral aspect; a. tip of gonopod, inner side aspect.
265. Bombomima partitor Banks; clasper, lateral aspect.
266. Bombomima partitor Banks; pseudoclasper, lateral aspect.
267. Bombomima partitor Banks; aedeagus, lateral aspect.
268. Bombomima columbica Walker; male genitalia, lateral aspect.
269. Bombomima columbica Walker; clasper, lateral aspect.
270. Bombomima columbica Walker; pseudoclasper, lateral aspect.
271. Bombomima fernaldi Back; male genitalia, lateral aspect.
272. Bombomima fernaldi Back; clasper, lateral aspect.
273. Bombomima fernaldi Back; pseudoclasper, lateral aspect.
274. Bombomima posticata Say; male genitalia, lateral aspect.
275. Bombomima posticata Say; clasper, lateral aspect.
276. Bombomima posticata Say; pseudoclasper, lateral aspect.





277. Proctacanthella cacopiloga Hine; male genitalia, lateral aspect.
278. Proctacanthella cacopiloga Hine; gonopod and clasper, inner side aspect.
279. Proctacanthella cacopiloga Hine; aedeagus, a. lateral aspect, b. ventral aspect.
280. Nerax bicaudatus Hine; male genitalia, lateral aspect.
281. Nerax bicaudatus Hine; aedeagus, lateral aspect.
282. Asilus delusus Tucker; male genitalia, lateral aspect.
283. Asilus occidentalis Hine; male genitalia, lateral aspect.
284. Asilus occidentalis Hine; gonopod and clasper, inner side aspect.
285. Asilus callidus Williston; male genitalia, lateral aspect.
286. Asilus callidus Williston; gonopod and clasper, inner side aspect.
287. Asilus callidus Williston; aedeagus, lateral aspect.
288. Asilus nitidifacies Hine; male genitalia, lateral aspect.
289. Asilus nitidifacies Hine; gonopod and clasper, inner side aspect.
290. Asilus nitidifacies Hine; aedeagus, lateral aspect.
291. Asilus auriannulatus Hine; male genitalia, lateral aspect.
292. Asilus auriannulatus Hine; gonopod and clasper, inner side aspect.
293. Asilus auriannulatus Hine; male genitalia, ventral aspect.
294. Asilus auriannulatus Hine; aedeagus, a. ventral aspect, b. lateral aspect.
295. Asilus mesae Tucker; male genitalia, lateral aspect.
296. Asilus mesae Tucker; gonopod and clasper, inner side aspect.
297. Asilus mesae Tucker; aedeagus, lateral aspect.
298. Asilus cumbipilosus new species; male genitalia, lateral aspect.
299. Asilus cumbipilosus new species; gonopod and clasper, inner side aspect.
300. Asilus cumbipilosus new species; aedeagus, a. lateral aspect, b. dorsal aspect.
301. Asilus aridalis new species; male genitalia, lateral aspect.
302. Asilus aridalis new species; gonopod and clasper, inner side aspect.



303. Asilus aridalis new species; aedeagus, lateral aspect.
304. Asilus gramalis new species; male genitalia, lateral aspect.
305. Asilus gramalis new species; gonopod and clasper, inner side aspect.
306. Asilus gramalis new species; aedeagus, a. lateral aspect, b. dorsal aspect.



## LIST OF ABBREVIATIONS

A	anal vein	hp	hypopleuron
Ac	anal cell	hpr	hypandrial process
ae	aedeagus	hv	humeral vein
Al	alula	lb	labium
Ax	axillary cell	M	medial vein
B	basal cell	mb	maxillary blade
Ba	basalare	Mc	marginal cell
Bc	basal costal cell	m-cu	mediocubital crossvein
blb	basilabellum	msn	mesonotum
C	costal vein	msp	mesopleuron
c	carina	mtn	metanotum
Cc	costal cell	mtp	metapleuron
cl	clasper	P	posterior cell
cst	cardostipes	p	palpus
Cu	cubital vein	pc	posterior callus
cx	coxa	pcl	pseudoclasper
D	discal cell	pf	"palpifer"
dlb	distilabellum	pgr	proctiger
e	eye	pm	prementum
em	epimeron	pn	pronotum
es	episternum	pp	pteropleuron
gb	gibbosity	ps	presternum
gn	gena	pst	prosternum
gp	gonopod	ptn	postnotum
h	humerus	R	radial vein
ha	hypandrium	r-m	anterior crossvein





s	suture	Sm	submarginal cell
Sa	sabalare	sp	spiracle
Sc	subcostal vein	spl	sternopleuron
sc	scutellum	ss	superior forceps
ScC	subcostal cell	zst	zygostipes



# TABLE OF CONTENTS

	Page
ABSTRACT .. .. .	i
ACKNOWLEDGEMENTS .. .. .	ii
LIST OF FIGURES .. .. .	iii
LIST OF ABBREVIATIONS .. .. .	xvi
1. 0. INTRODUCTION .. .. .	1
1. 1. MATERIAL AND METHODS .. .. .	2
1. 1. 1. Field work and deposition of material .. .. .	2
1. 1. 2. Museum work .. .. .	3
1. 2. HISTORICAL ASPECTS .. .. .	4
1. 2. 1. General History .. .. .	4
1. 2. 2. History of the study in Canada .. .. .	5
1. 2. 3. History of the study in Alberta .. .. .	5
1. 3. MORPHOLOGY OF THE ADULT ASILIDAE .. .. .	6
1. 3. 1. Description and definition of the morphological characters .. .. .	6
1. 3. 2. Chaetotaxy .. .. .	17
1. 4. IMMATURE STAGES .. .. .	19
1. 5. HABITATS OF THE ADULTS .. .. .	20
1. 6. DISTRIBUTION OF ASILIDAE IN ALBERTA .. .. .	22
1. 6. 1. Prairie .. .. .	22
1. 6. 2. Boreal forest .. .. .	23
1. 6. 3. Subalpine and Montane regions .. .. .	23
1. 6. 4. Parkland and Boreal-Cordilleran regions .. .. .	24
1. 7. FEEDING HABITS .. .. .	24
1. 8. PREDATORS .. .. .	24
1. 9. SEASONAL SUCCESSION OF SPECIES .. .. .	25
2. 0. TAXONOMIC TREATMENT .. .. .	27





2. 1. KEY TO THE SUBFAMILIES OF ASILIDAE OF ALBERTA .. ..	27
2. 2. SUBFAMILY DASYPOGONINAE .. .. .	27
2. 2. 1. Key to the genera of Daypogoninae of Alberta .. ..	28
2. 2. 2. Genus <u>Stichopogon</u> Loew .. .. .	29
2. 2. 2. 1. Key to the species of <u>Stichopogon</u> Loew of Alberta	30
2. 2. 3. Genus <u>Lasiopogon</u> Loew .. .. .	33
2. 2. 3. 1. Key to the species of <u>Lasiopogon</u> Loew of Alberta ..	34
2. 2. 4. Genus <u>Stenopogon</u> Loew .. .. .	47
2. 2. 4. 1. Key to the species of <u>Stenopogon</u> Loew of Alberta	48
2. 2. 5. Genus <u>Ospriocerus</u> Loew .. .. .	55
2. 2. 5. 1. Key to the species of <u>Ospriocerus</u> Loew of Alberta	55
2. 2. 6. Genus <u>Holopogon</u> Loew .. .. .	58
2. 2. 6. 1. Key to the species of <u>Holopogon</u> Loew of Alberta	60
2. 2. 7. Genus <u>Heteropogon</u> Loew .. .. .	62
2. 2. 8. Genus <u>Lestomyia</u> Williston .. .. .	64
2. 2. 9. Genus <u>Nicocles</u> Jaennicke .. .. .	66
2. 2. 10. Genus <u>Cyrtopogon</u> Loew .. .. .	68
2. 2. 10. 1. Key to the species of <u>Cyrtopogon</u> Loew of Alberta	69
2. 2. 11. Genus <u>Eucyrtopogon</u> Curran .. .. .	81
2. 2. 11. 1. Key to the species of <u>Eucyrtopogon</u> Curran of Alberta	82
2. 2. 12. Genus <u>Comantella</u> Curran .. .. .	88
2. 2. 12. 1. Key to the species of <u>Comantella</u> of Alberta ..	88
2. 3. SUBFAMILY LAPHRIINAE .. .. .	89
2. 3. 1. Key to the genera of Laphriinae of Alberta .. ..	90
2. 3. 2. Genus <u>Pogonosoma</u> Rondani .. .. .	90
2. 3. 2. 1. Key to the species of <u>Pogonosoma</u> Rondani of Alberta	91
2. 3. 3. Genus <u>Bombomima</u> Enderlein .. .. .	93



2. 3. 3. 1. Key to the species of <u>Bombomima</u> Enderlein of Alberta	93
2. 3. 4. Genus <u>Laphria</u> Meigen .. .. .	97
2. 3. 4. 1. Key to the species of <u>Laphria</u> Meigen of Alberta ..	98
2. 4. SUBFAMILY LEPTOGASTRINAE .. .. .	106
2. 4. 1. Genus <u>Leptogaster</u> Meigen .. .. .	106
2. 4. 1. 1. Key to the species of <u>Leptogaster</u> Meigen of Alberta	107
2. 5. SUBFAMILY ASILINAE .. .. .	109
2. 5. 1. Key to the genera of Asilinae of Alberta .. .. .	109
2. 5. 2. Genus <u>Promachus</u> Loew .. .. .	109
2. 5. 3. Genus <u>Proctacathella</u> Bromley .. .. .	111
2. 5. 4. Genus <u>Nerax</u> Hull .. .. .	112
2. 5. 4. 1. Key to the species of <u>Nerax</u> Hull of Alberta ..	112
2. 5. 5. The <u>Asilus</u> complex .. .. .	115
2. 5. 5. 1. Key to the species of the <u>Asilus</u> complex of Alberta	116
2. 5. 6. Genus <u>Negasilus</u> Curran .. .. .	127
3. 0. REFERENCES .. .. .	129





## 1. 0. INTRODUCTION

The Asilidae, also known as robber flies or assassin flies, are a group of predaceous insects, easily recognized by their morphological characters as well as by their activities. All of these flies have an excavated front and vertex to form a V-shaped depression. Both sexes are dichoptic. Some characters show sexual dimorphism.

The family consists of about 5000 known species, distributed over the six zoogeographic regions. Hull (1962) listed the number of species occurring in each region. According to Martin (1965), the Nearctic Region has the greatest number of species.

In addition to the now-living species, some extinct species have also been described. Fifteen of 18 genera described from the Eocene, the Oligocene, and the Miocene, are still living (Hull, 1962).

There are five subfamilies: Dasypogoninae, Leptogastrinae, Laphriinae, Asilinae, and Megapodinae. The last subfamily is confined to the Neotropical region.

Alberta is a province where many different zoogeographic elements meet and play roles in the diversity of the living beings occurring there. Allan (1943) has described the geology, Moss (1955) has provided the description of the plant communities in Alberta, and Odynsky (1962) has presented a map of soil zones of Alberta.

Few groups of insects and other arthropods of Alberta, have been studied on a regional basis. The systematics of the acridoid Orthoptera of southern Alberta, Saskatchewan, and Manitoba, have been presented by Brooks (1958), and a study of the spotted fever and other Albertan ticks has been done by Brown (1944). Lists of some groups of insects have been published, including an annotated list of the Diptera of Alberta by Strickland (1938; 1946).

To provide a basis for further work, the taxonomy of every group of flies needs to be worked out. As part of the general program to increase knowledge of the Alberta fauna, adults of the Asilidae were studied. The study was mainly of taxonomy and





geographical distribution, but some ecological notes, which may be useful for further ecological study, are also presented.

## 1. 1. MATERIAL AND METHODS

The material for this study was obtained from the following institutions: Department of Entomology, University of Alberta; Canadian National Collection, Entomology Research Institute, Canada Department of Agriculture, Ottawa, Ontario; the American Museum of Natural History, New York City, New York; the United States National Museum, Washington, D. C.; Department of Entomology, Washington State University, Pullman, Washington; and the California Academy of Sciences, San Francisco, California. Field work was also carried out, and loaned materials were also obtained from private collection of Mr. Don Elliott, Calgary, Alberta, and of Mr. Lawrence M. Kenakin, Edmonton, Alberta.

### 1. 1. 1. Field work and deposition of materials

The Asilidae in the collection of the University of Alberta were collected mostly in the southern half of the province. Material is not available from the Swan Hills and the area between Jasper and Grand Prairie. For the northern half of the province, collections have been made in few localities (Fig. 1.)

Field work was carried out in the summers of 1963 and 1964, and additional records were obtained.

The insects were collected with nets, killed with potassium cyanide and pinned immediately. Freshly killed specimens tend to darken, because "body fluid" flows over the surface. This difficulty can be overcome by immersing the specimens in xylene or benzene (Bromley, 1946).

The newly collected specimens were deposited in the collection of the University of Alberta, and the holotypes and the allotypes of the new species are



deposited in the Canadian National Collection in Ottawa.

The deposition of the specimens examined is indicated by abbreviations between parentheses following locality names.

The abbreviations are:

AMNH	American Museum of Natural History, New York City, New York.
CAS	California Academy of Sciences, San Francisco, California.
CNC	Canadian National Collection, Ottawa, Ontario.
DE	Mr. D. Elliott, Calgary, Alberta.
LMK	Mr. L. M. Kenakin, Edmonton, Alberta.
UA	University of Alberta, Edmonton, Alberta.
USNM	United States National Museum, Washington, D. C.
WSU	Washington State University, Pullman, Washington.

#### 1. 1. 2. Museum work

Identifications were made by comparison with identified material or with type specimens, and some specialists were consulted.

For the morphological study, dried specimens were relaxed in a relaxing chamber for 24 hours, and dissected. The parts to be examined were boiled in 5% potassium hydroxide for an hour. The specimens were then transferred into 80% acetic acid for 15 minutes, and preserved in 70% alcohol.

The drawing of the specimens was made with the aid of a camera lucida.

The total length of a specimen was measured from the tip of the mystax to the tip of the superior forceps of the male genitalia or to the tip of the ovipositor, by the aid of a divider and a metric ruler.





## 1. 2. HISTORICAL ASPECTS

The Asilidae is a world-wide family of Diptera. Studies of this group can be traced back to a study of various insects from Germany by Frisch in 1720 - 1738 (Hull, 1962).

In the following discussion, the historical aspects are considered under three headings: general history; history of the study in Canada; and that of Alberta.

### 1. 2. 1. General history

The study of the Asilidae on a world-wide basis was begun by Hermann Loew in 1847 (Hull, 1962), and many other dipterists have also contributed to the knowledge of these flies.

Linnaeus (1758) described 12 species under the name Asilus, but one of them has been assigned to a different family. In Edition 12 of the Systema Naturae (1767), he added four more species. Two of these 15 species now remain in Asilus L., and three are doubtfully treated under the same genus, while the rest have been assigned to other genera of the Asilidae.

A second genus, Damalis, was erected by Fabricius in 1805 (Hull, 1962). He also described some species from countries other than Europe. According to Hull (1962), Loew's works were the most important at the time; he proposed 83 genera, of which 75 are still recognized.

In the late 19th and the beginning of 20th century and later, the students of Asilidae undertook intensive regional studies on this group: for example, Becker for the fauna of north and east Africa; Bezzi for Italy; Hermann and Carrera for South America; Eflatoun for Egypt; Enderlein and Engel for the Palaearctic Region; Bigot and De Meijere for the Oriental Region, and Riccardo for South Africa, Australasia, and Australia. The North American fauna has been studied by Aldrich, Back, Cole, Coquillett, Curran, Hine, Hull, James, Martin, Osten-Sacken, Pritchard, Say, Snow,



Wilcox, Williston, and others. Hull (1962) has studied the Asilidae of the world and provided a good bibliography.

Studies on the fossil Diptera, including the Asilidae have been undertaken by Bode, Cockerell, and Hull.

### 1. 2. 2. History of the study in Canada

The history of the study of the Asilidae in Canada cannot be separated from that of North America as a whole. The study was started by Say in 1823 as a part of a general study on Diptera. His "Complete Writings on the Entomology of North America", which included the Asilidae, were published and edited by LeConte (1859). Shortly thereafter, Williston contributed to the knowledge of the Asilidae in North America. His final work was a "Manual of North American Diptera", published in 1908. A catalogue of North American Diptera was published by Aldrich in 1905. In 1909, Back published a lengthy paper on the subfamilies Dasypogoninae and Leptogastrinae of North America, and provided a discussion on the morphology of this group in general. Coquillett published extensively on the taxonomy of this family in the latter part of the 19th and early part of the 20th century. Bromley, Cole, Curran, Hine, and others, followed Coquillett. In this period, revisions led to the erection of many new genera. Bromley studied the habits of the adults. Taxonomic work was continued by Wilcox, Martin, and Hull, who are presently active.

### 1. 2. 3. History of the study in Alberta

The Asilidae of Alberta have not been studied in detail, although a few new species were described from this province (Curran, 1923). In Strickland's (1938; 1946) lists, 66 species of Asilidae were included, but eleven of these species probably do not occur in Alberta. In this study, 19 species have been added to the Alberta list, and of these eight are new species.





### 1. 3. MORPHOLOGY OF THE ADULT ASILIDAE

In this section, the taxonomically important external structures of the adults are discussed under two headings: description and definition of the morphological characters; and chaetotaxy.

#### 1. 3. 1. Description and definition of the morphological characters

The morphological terms used in the text are defined below, in conjunction with a general description of asilid structure.

The head (Figs. 48, 49, and 50) of the Asilidae has several subdivisions or areas. Two eyes (e), always dichoptic, occupy the sides of the head. The facets are gradually larger toward the face. The dorsal areas of the head between the eyes are called vertex and front; these cannot be clearly separated one from the other. In about the middle of these areas is the ocellar plate or ocellar triangle, on which three ocelli are always present. The front is limited anteriorly by the antennal base or sometimes by a very weak suture above the antennal base (Figs. 49 s, 50 s). Because the vertex is excavated, its posterior margin is obscure. On these areas, bristles or hairs are usually present. A pair of lateral grooves are on the orbital margin beside the antennal base, which converge toward the foramen magnum. The face (Walton, 1909) or prefrons (Crampton, 1942) is beneath the antennae and between the eyes, limited on the lower side by a cross line through the upper margin of the mouth opening. On the lower side of the face, is a strong or weak gibbosity (Figs. 48 gb, 50 gb), on which a patch of bristles, the mystax, is always present. The areas below the eyes on either side of the mouth opening are called genae (Fig. 48 gn), on the upper corners of which are the anterior tentorial pits (Snodgrass, 1935) or pretentorial pits (Crampton, 1942). The entire area behind the eyes is called the occiput. The occiput is provided with bristles on the upper submarginal edge, while on the lower side, the area is covered with a pile of fine hairs or a "beard".





The antenna (Figs. 118–147) consists of three articles, and usually with a style, which is a conglomeration of several articles beyond the third (Crampton, 1942). Crampton also suggested using the term "cerostyle" for this antennal structure, because stylus is a term applied to abdominal appendages. The terms "three-segmented" and "style" are used in the text. Some species lack the style. If it is present it may be of one or more microsegments with or without terminal spine.

The mouthparts comprise the proboscis (Figs. 60–63), which functions as a piercing organ. Becher (1882) described this organ briefly.

The labrum–epipharynx (Fig. 29) is relatively small, subtriangular, tapering apically, covering the basal half of the proboscis which is left uncovered by the labium. In some species the labrum is elevated dorsally to form a keel or carina of the proboscis. The carina is also formed by the edges of the labium (Fig. 60 c). On the ventral side of the labrum–epipharynx is a ridged groove along the middle, ending subapically. This structure fits perfectly on the longitudinal opening of the hypopharynx to form a channel (Fig. 30). According to Melin (1923), the ridged groove is the epipharynx, but Crampton (1942) stated that "the epipharynx is a modified portion of the inner or posterior lining of the labrum, and since it is merely a modified portion of the labrum, it is not necessary to refer to the labrum of the higher Diptera as the labrum epipharynx, as though it were a composite structure formed by the union of a distinct labrum and epipharynx". The maxillae (Fig. 35) consist of a pair of elongate semicircular blades (Hull, 1962) or lobes (Melin, 1923), truncate or pointed apically, which are called maxillary endites by Hoyt (1952) (Figs. 34, 35 mb). According to Crampton (1942), these structures are the galeae, but according to Imms (1944; 1960) they are laciniae; these structures were misidentified by Smith (1890) as palpifers. Melin (1923) described them in detail. The other structures of the maxillae are the stipites and the palpi. According to Hoyt (1952) the cardines and stipites are fused and form cardostipites. In some species, the left and the right cardostipes are fused together and form a single



sclerite called zygostipes (Crampton, 1942) with a weak line or "suture" in the middle (Fig. 35 zst). The palpus is either single or two-segmented (Figs. 35 p. 36, 42-46). If it is two-segmented, the basal piece is always membraneous on the side, while the second one is heavily sclerotized, and provided with bristles or hairs. In some species, the palpus is born on a "palpifer" (Fig. 39 pf), a stumpy projection from the cardostipes. It may be the vestige of the first segment which has fused to the cardostipes. In some species, the second segment is partly hollow apically, with an opening on the tip (Fig. 40).

The hypopharynx (Figs. 31-33), the main piercing organ, is a hollow tube, open dorsally. The tube consists of three elongate rods. The bottom median sclerite is straight, solid, concave dorsally, convex or forming a ridge ventrally (Fig. 32), detachable from the other two lateral pieces (Fig. 33). The former is connected to the salivary duct. The lateral rods meet ventrally under the median sclerite. The apical half of the dorsal edge is provided with considerably long bristles, arranged in a single row. These probably function as a food strainer. According to Dimmock (1881), the now so-called hypopharynx was considered by Blanchard as mandibles which grew together. Smith (1890) recognized three pieces of the hypopharynx, which he called ligula (the centre) and paraglossae; he stated further that they were not easily separable.

The labium (Figs. 35 lb, 37) is the sheath for the above mentioned parts. It is divided into several areas. The basal piece, pointed or rounded apically (Fig. 37 pm), is called the base joint (Melin, 1923) or prementum (Crampton, 1942); Hoyt, 1952); it is usually excavated laterally at the basal half, forming a space occupied by the labrum. This part is pilose ventrally. Beyond the prementum is a pair of lobes, the labellar lobes or the labella (Crampton, 1942), each one of which has two subdivisions, basilabellum (Fig. 37 blb) and distilabellum (Fig. 37 dlb) (Crampton, 1942) or labial palpal segment one and labial palpal segment two (Hoyt, 1952), separated by a more or less transverse cleft. The distilabellum is usually divided into two parts, sclerotized basally and membraneous apically. The pattern of the sclerotized part is variable







In some species, the membranous part is only on the edge (Fig. 38). The tips of the labellar lobes bear bristles, which according to Melin (1923), are sensory. Another structure, attaches to the labium, was called fulcrum thecae by Hansen (Melin, 1923), or the anterior labial plate by Hoyt (1952). The tip of this structure is membranous and free, and is called the ligula by Hoyt (1952).

Studies of the homology of the labium of the holometabolous insects, particularly the Diptera, have been done by Crampton (1923; 1925) and MacGillivray (1924). Kellogg (1902) studied postembryonic development in Simulium to trace the homologies of the mouthparts of the Diptera.

The thorax (Figs. 51-53) - In general, the thorax of the Asilidae is robust and more or less spherical or oval. The prothorax is small and short and consists of pronotum (pn), episternum (es), epimeron (em) or lateral propleuron (Hull, 1962), basisternum or prosternum (pst) (Clements, 1951; Hull, 1962), and presternum (ps). The pronotum is possibly what is called the anterior ridge by Hull (1962). It is the foremost dorsal sclerite, separated from the episternum by a transverse furrow. The episternum is also called anepisternum or upper propleuron by Shannon (1923). In some species, probably the more primitive ones, the pronotum occupies the entire dorsum (Fig. 56), but in more advanced species the posterior dorsum is occupied by the episternum (Fig. 55). The episternum is separated from the epimeron by a longitudinal, complete or incomplete, suture. The epimeron is also called katepisternum or lower propleuron by Shannon (1923). In the more primitive species, the basisternum or the prosternum comes in contact with the epimeron as a single piece (Figs. 53, 65, 66), while in the more advanced species, they are separated by membrane (Figs. 54). In the more primitive species, the pronotum, the episternum, and the epimeron, are covered by hairs and pile, in the more advanced groups, by bristles. The presternum is bare, pilose, or with bristles.

The entire prothorax is clearly separated from the mesothorax by a transverse suture. The mesothorax is the largest part of the thorax (Figs. 51, 52). Dorsally, the



mesothorax is occupied by the mesonotum or the scutum (msn). It has two pairs of calli, anteriorly the humeral calli or the humeri (h), and posteriorly the postalar calli or the scutellar level (pc). Above each of the wing bases is a transverse suture, extending postero-laterally, not touching each other. In some species, they are continued posteriorly by a shallow furrow. The humerus is bare, tomentose, pilose, or with hairs or bristles. The postalar callus is either pollinose or glabrous, and is always provided with bristles or long pile. The mesonotum is usually pollinose. Short appressed bristles or setulae, or long pile or hairs, are also present. Stout and strong bristles are usually also present. They are arranged in relatively constant positions. This kind of bristle is also present on some other parts of the body, which is discussed in more detail below.

The scutellum (Fig. 51 sc, 52 sc) is pollinose or shiny, provided with pile, hairs, or bristles. In some species, the scutellum is not convex, but has a shallow central depression. Posterior to, and situated under the scutellum, is the metanotum or the postscutellum or the second mediotergite; it is usually pollinose or tomentose.

The mesothoracic pleuron (Fig. 51) is described as follows. The first sclerite next to the prothorax is the mesoepisternum. It is divided into two areas by incomplete sutures. The upper part is the mesopleuron or the mesoanepisternum (msp), the lower part is the sternopleuron or the mesokatepisternum (spl). On the upper posterior corner of the mesopleuron, in front of the wing base, there are two small sclerites, called the basalare (Ba) and the subalare (Sa). Below the wing base and posterior to the mesopleuron is the pteropleuron or the mesoepimeron (pp), which is separated by an incomplete suture from the metapleuron or the laterotergite (mtp). The hypopleuron (hp) is below the pteropleuron, formed by the mesomeron and the metaepisternum. The metathoracic pleuron, except the metaepisternum, and the metanotum, form the post-pleuron (ptn).

There are two thoracic spiracles (sp): anterior spiracle, between the humerus





and the mesopleuron; and posterior spiracle, between the metapleuron and the hypopleuron.

The wings (Fig. 57) – All members of this family have a pair of normal wings. They are always membranous, and in general, the surface is covered with microtrichiae, although in some species, the microtrichiae are completely absent. The venation is typical of the orthorrhaphous Brachycera, with a discal cell in about the centre of the wing. There are several different systems of nomenclature: Loewian, Schinerian, Comstock-Needham system, Shannon-Bromley system, and Alexander system (Alexander, 1929) but the system used by Hull (1962) is applied here (Fig. 57A).

The costa (C) always ends before the wing apex, and the subcosta (Sc) at the middle of the costa. The radius has five branches. The first branch ( $R_1$ ) or the first longitudinal vein ends long before the wing tip. The second and the third branches fuse to form the second longitudinal vein ( $R_{2+3}$ ). In some species, the first and the second longitudinal veins fuse shortly before they reach the wing margin (Figs. 160–162, 164–169). The fourth and the fifth branches of the radius ( $R_4$  and  $R_5$ ) fuse basally to form the third longitudinal vein, separate apically to form the anterior and the posterior branches of the third vein. In some species, the anterior branch is provided with a complete or incomplete spur near the point of branching (Figs. 165–167). The posterior branch in most cases, ends behind the wing tip. The media (M) has three branches. The main stem gives rise to the first branch of the media or the fourth vein ( $M_1$ ), which in turn branches off for the second branch of media ( $M_2$ ), and the third branch of media ( $M_3$ ) or the posterior intercalary vein. In some groups, this vein does not end at the margin, but fuses with the first branch of cubitus or the fifth vein ( $Cu_1$ ) at a short distance from the margin (Figs. 150, 151, 160–162, 164–169). The latter vein branches off from the cubitus (Cu) to separate from the second branch of cubitus ( $Cu_2$ ). The first branch of cubitus is connected to the main stem at the base by an oblique vein called the anterior branch of cubitus. The anal vein had, originally, three branches, but in most cases, the third branch (3A) is greatly reduced or absent. In highly





microtrichiate wings, there is a bare stripe at this vein. The first anal vein (1A) is situated very closely to the main stem of cubitus, and ends at about the branching point of the cubitus. The second branch of cubitus and the second branch of anal vein (2A), in some species, fuse for a short distance before reaching the margin.

The longitudinal veins are in certain places joined by crossveins. The humeral crossvein (hv) is situated between and connecting the costa and the subcosta. The radio-medial (r-m), or the anterior, small, or medial cross vein, connects the third to the fourth vein. It is situated within the range of the discal cell. The discal- or the medio-cubital crossvein (m-cu) connects the third branch of the fourth vein to the first branch of the fifth vein. In some species, this crossvein is greatly reduced to a dot or completely absent, so that the first branch of cubitus and the third branch of the fourth vein look like two crossing veins. In others, the two longitudinal veins fuse for a short distance (Figs. 163, 165-168).

The cells are the spaces formed by the longitudinal and the crossveins (Fig. 57B). The basal costal (Bc) or the first cell is situated between the costa and the subcosta, before the humeral crossvein; beyond which is the costal cell (Cc). The mediastinal or the subcostal cell (Scc) is extended from the wing base to the subapical wing margin. Posteriorly, this cell is followed by the marginal cell (Mc), which starts from about the middle of the subcostal cell. The marginal cell is either open or closed. Following the marginal cell is the first submarginal cell (Sm1), which is always open. If the spur on the anterior branch of the third vein is complete, then the first submarginal cell is divided into two cells (Fig. 160); the apical is the second submarginal cell. The following cell, situated between the two branches of the third vein, becomes the third submarginal cell, but if the first submarginal cell is not divided, the former is called the second submarginal cell (Sm2). The anterior or the first basal cell (B1) is extended from the base to about the middle of the wing, followed posteriorly by the posterior or the second basal cell (B2). Beyond the anterior basal cell is the first posterior cell (P1), followed posteriorly by



the second (P2) to the fifth (P5). At about the middle of the wing is a closed cell, surrounded by the basal and the posterior cells, called the discal cell (D). The anal cell (Ac) is usually elongate, limited by the cubitus, the second branch of cubitus, and the second branch of anal vein. It is either closed or open. At the tip of the anal cell is usually a notch or excision, called preaxillary excision. Posterior to the anal cell, is the axillary cell (Ax), which is separated from the axillary or the posterior lobe or the alula (Al), by a deep furrow.

In general, the posterior margin of the wing is provided with fairly long marginal hairs or fringe scales.

The legs (Figs. 74, 79). – These are strong, stout, and bristly. Verrall(1901) clarified the nomenclature of the legs of insects: the anterior legs are the first two pairs, and the posterior legs are the last two pairs of legs (compared to the terms front, middle, and hind legs). Holway (1935) gave some definitions and terminology of the parts of the tarsus of several orders of insects. In some species of the Leptogastrinae, and also of some Stichopogonini, the number of bristles is greatly reduced; they are present only on the tibiae and the lower sides of tarsi (Figs. 85, 86).

The coxae of the front legs are longest, and those of the hind legs are shortest. The front and the middle pairs are provided with bristles and hairs on the anterior sides; on the hind pair, the hairs are on the sides and not very conspicuous.

The trochanters of the front and the middle legs are bare, but the hind pair usually have bristles, hairs, or pile.

The femora are long and slender. In most species, they are provided with strong and sharp bristles. In the Leptogastrinae, the femora are thickened at the tips and lack bristles (Fig. 85).

The tibiae are as long as the corresponding femora, but thinner. In Holopogon Loew, however, the tibiae are thickened apically (Fig. 84). Bristles are present, scanty in Stichopogon Loew and Legtogastrinae. At the apices of the tibiae, the bristles are







arranged circularly or semicircularly.

In almost all species of the Asilidae, bristles are present on the tarsal segments, circularly and subapically. The claws are fairly long, usually as long as the corresponding last tarsal segment. Except in some genera of the Leptogastrinae, these claws are provided with pulvilli underneath, slightly broader at the apex. In some genera of the Leptogastrinae, the pulvilli are modified into empodium-like structures or absent (Fig. 86). The empodium is always bristle-like, absent from one or two genera of Leptogastrinae (Hull, 1962).

The abdomen. - In most cases, the abdomen is elongate, slender to almost petiolate (Leptogastrinae; Fig. 102), or robust (Laphria Meigen, Bombomima Enderlein, and Hyperechia Schiner; Fig. 101), and in some groups, for example Blepharotes Westwood, the abdomen is wide and greatly flattened. Eight segments are usually visible externally, and are glabrous or pollinose. The first segment in some Dasypogoninae and most of the Asilinae, is elevated and conspicuous at the sides as calli (Fig. 104). This segment is always provided with bristles, or in Holopogon Loew, with long pile. In some species, the bristles are also present on the succeeding segments. The second segment is twice or three times as long as the first (in Dasypogoninae and Asilinae; Figs. 87, 104), subequal (in Laphriinae; Fig. 101), or up to six times longer (in Leptogastrinae; Figs. 102, 103). The succeeding segments are about equal in length and about two thirds of the second. In addition to the bristles, long coarse hairs or pile are also present.

The ovipositor. - According to Cole and Wilcox (1938), the ovipositor has not been studied sufficiently to show the true relationships of the parts.

In the Dasypogoninae (Figs. 89-91, 106, 107), the eighth sternum has valves, which are probably the ninth sternum (Cole and Wilcox, 1938). The ninth tergum consists of a single sclerite or of two lateral sclerites, connected basally (Fig. 92). Each of these sclerites, is provided with a row of spines, which are arranged in a curved



line. The spines are of several types: sharp, blunt, or spoon-shaped (Hull, 1962). Because of their function as spine-bearing organs, the sclerites are called acanthophorites (Hull, 1962), or semi-annular pieces (Melin, 1923). Melin (1923) wrote that these pieces are capable of sliding in the horizontal plane. The function of the spines is undoubtedly soil or sand drilling, in relation to egg-laying. In Phellus Walker and Dioctria Meigen (and other lower Dasypogoninae) and all the Asilinae, the tergum is undivided (Hull, 1962).

The ovipositor of the Laphriinae (Figs. 108-111) is not much different from the preceding group, but is without spines. The eighth sternum is terminated by a cleft lobe (probably the ninth sternum). The eighth tergum is provided with strong bristle-like hairs. The ninth tergum tapers more or less apically, but is broader apically in Pogonosoma Rondani, and forms a ring-like structure at the end (Fig. 111). This structure is also found in Cerotainiops Curran.

In the female Leptogastrinae, the eighth segment is little modified. It is much shorter than the preceding segment and semicircularly excavated. The ninth sternum, excised apically, more or less fits into the excavation of the preceding segment, and is ventrally "ridged". The ninth tergum is absent or may be fused with other segments.

The ovipositor of the Asilinae is conical (Fig. 113), or in the higher groups (Nerax Hull, Promachus Loew, and the Asilus complex), blade-shaped (Fig. 114). This elongate structure is formed by the seventh and the eighth segments. The ninth tergum is sometimes excised (as in Promachus Loew) and with backward lateral rod-like projections (Fig. 112). A structure called the apex of the eighth ventral segment by Melin (1923) is probably the ninth sternum, and is usually fused with the preceding segment. In Nerax Hull, this structure is separated from the eighth sternum; it consists of two lateral halves (Fig. 114). In some species, Philonicus albiceps Meigen (Melin, 1923), Proctacanthella spp., and some species of the Asilus complex, the ventral and posterior edges of the ninth sternum are provided with a row of spines (Fig. 113).





Another structure called terminal lamellae (Melin, 1923) or tenth tergum, in some species (Philonicus albiceps Meigen and Proctacanthella spp.), is also provided with spines. This segment is functionally similar to the acanthophorites of the Dasypogoninae.

The male genitalia (Figs. 58, 59). – Hull (1962) has defined some terms dealing with the parts of the male genitalia of the Asilidae. Papers on the terminology of these organs can also be found in Cole (1927), Crampton (1942), van Emden and Hennig (1956), and Snodgrass (1957).

The external genitalia of the male Asilidae are complicated structures, comprising the ninth abdominal segment (Hull, 1962; van Emden and Hennig, 1956). The dorsal part is the epandrium, and the ventral part is the hypandrium (ha). The epandrium is provided with superior forceps (Hull, 1962), upper forceps (Hine, 1909), or surstyli (Crampton, 1942, not Cole, 1927) (ss). According to Snodgrass (1957), these forceps "may be solid outgrowths of the tergum, flexible at their bases, or freely movable by muscles, and they probably serve as claspers, but it is incongruous that either gonopods or parameres should be borne on the tergal plate of a segment". Another structure, situated between the epandrium and the hypandrium, usually attached to the latter, is a pair of sclerites called the gonopods (Hull, 1962), inferior forceps (Oldroyd, 1938), or lower forceps (Hine, 1909) (gp). Each of these sclerites bears a medio-internal process, called clasper (Hull, 1962) or interior forceps (Wesche, 1906; Cole, 1927) (cl). In the Laphriinae, another structure attached to the base of the clasper, between the clasper and the gonopod, is called pseudoclasper (Hull, 1962) or palpi genitalium (Wesche, 1906) (Fig. 251 pcl).

The structures called surstyli in the species of Lasiopogon Loew (Cole and Wilcox, 1938) (Fig. 59 ss), are probably the superior forceps. A pair of structures attached to the hypandrium is either the gonopods or the claspers (of Hull's). If the former is the case, then the claspers are missing; and if the latter is the case, the gonopods are missing. Temporarily, the term hypandrial processes is applied to the





structures in question (Fig. 59 hpr).

Genital inversions have been reported by several authors in several genera of the Asilidae. According to Lamb (1923), the inversion is produced by a twist of  $180^\circ$  about the main axis of the body between the sixth segment and the hypopygium. The eighth segment is twisted about  $150^\circ$ . Concerning genital inversion in the Asilidae, Hull (1962) states that in the Dasypogoninae, it occurs during copulation, and the genitalia return to the dorsal position, although in dried specimens, they are usually found in partial or complete inversion. In the Laphriinae, according to Hull (1962), the inversion is permanent. A male specimen of an unidentified species of Bombomima has uninverted genitalia. The specimen is in the collection of the Department of Entomology, University of Alberta.

### 1. 3. 2. Chaetotaxy

Like other families of Diptera, the Asilidae have macrochaetae or bristles, which are more or less constant in arrangement within taxa of various ranks. This arrangement is called chaetotaxy (Osten-Sacken, 1884).

The bristles vary in number, size, position, and color. The variation in number and size is usually parallel in all parts, while the other variations are independent.

In the following discussion, the terminology used is based on that of Osten Sacken (1884) and Imms (1960). The cephalic bristles are as follows. The verticals are situated on the vertex, behind the ocellar plate; on the ocellar plate itself are the ocellars. In front of the ocellar plate, there are two groups of bristles or hairs: the fronto-orbitals, on each side of the front near the orbital margin, and the frontals, a pair of patches above the antennal base, between the frontal grooves. The mystax, a patch of bristles on the face or on the epistomal margin, is sometimes fine as in Holopogon Loew. The occipitals, a row of bristles behind the eye margin, are usually



present on the upper half only. The antennal bristles are present on the lower sides of either or both first two segments, but usually the segments are provided with short strong hairs only.

The thoracic bristles are present on all three segments of the thorax (Figs. 51, 52). The pronotals are bristles on the pronotum, continued downward on the proepisternum as proepisternals. The bristles on the proepimeron, the proepimerals or the prothoracic bristles (Osten Sacken, 1884), are present in some species, but absent from others. On the mesothorax, the bristles are present on certain sclerites. The humerals are on the humeral calli, usually on the anterior margin. A patch of bristles in front of the mesonotal suture, above the wing base, is called the presuturals, these sometimes extended to behind the humeral callus. The group of bristles behind the humeral callus is called the posthumerals. The intraalars are situated across the posterior callus. The bristles behind the mesonotal suture are the postsuturals. The dorsocentrals are the bristles along the submedian lines. They are not always present, and sometimes occur behind the mesonotal suture only. The acrostichals, along the median line, are always absent. The postalars are situated on the postalar callus. The scutellars are on the posterior scutellar edge. On the thoracic pleura, the bristles are also arranged in definite positions. The presternum is never provided with bristles, but in most cases, it is covered only with pile or stiff hairs. The bristles on the mesopleuron, the mesopleurals, are usually situated on the upper posterior corner of the sclerite; in some species these bristles are weak, and in others, the mesopleuron is provided only with hairs or pile. The metapleuron is either pilose, with hairs, or with bristles. The bristles are called metapleurals. In some groups of the Asilinae and the Laphriinae, the slope of the metanotum is provided with bristles or hairs.

The bristles on the legs are also constant in arrangement, although the number is variable within the species. A uniform terminology for the bristles on the femora and the tibiae was proposed by Grimshaw (1905). The arrangement is as follows: dorsal,







anterodorsal, anterior, anteroventral, ventral, posteroventral, and posterior. Bristles in some species are present on the coxae. The first coxals are situated on the anterior surface of the first coxae, generally not in regular arrangement. The second coxals are not in regular arrangement, and are situated on the anterior surface. The hind coxae have two different patches of bristles, the third coxals, on the anterior lower margin, in single row, and the laterocoxals, on the middle of the lateral surface, in a single row. In some species, the coxae are provided with stiff hairs or pile only. On the trochanters, the bristles are present on the hind pair only, situated on the ventral posterior margin or internal submargin, and called the trochanterals. The femorals, on the femora, vary with the species, in position and number. On the tibiae, the bristles are arranged in three, four, or five rows, and on the subapex, they are arranged circularly, varying in number from species to species, or within species as well. The tarsal bristles are situated on the subapices, arranged in circles, but absent from the ventral sides. In some species, two rows of bristles are present on the ventral surfaces of the basitarsi.

The abdominal bristles are almost always present on the sides of the first segment (Figs. 104, 105). In some species, the sides of the other segments are also provided with bristles. Here, the bristles do not require any special terminology.

On the male genitalia, bristles are sometimes present: on the hypandrium are the hypandrials, and on the gonopods are the gonopodals.

#### 1. 4. IMMATURE STAGES

According to Hull (1962), immature stages of 50 species are known. He also briefly described the general morphology of the eggs, larvae, and pupae, of the Asilidae. Descriptions of the immature stages of some species of this family have also been presented by Hennig (1952).

The larvae live in soil, decaying wood, or parts of plants. Some larvae are



predaceous (Malloch, 1917), but others have been reported to be able to live partly on vegetable materials (Melin, 1923).

Green (1917) described the biology of Bombomima thoracica Fabricius of North America.

Melin (1923) reported egg deposition on parts of plants, and Bromley (1946) described the egg deposition and habitats of the larvae as follows:

<u>Subfamilies</u>	<u>Egg deposition</u>	<u>Habitat of larvae</u>
Leptogastrinae	dropped singly;	in the soil
Dasypogoninae	dropped singly, or inserted in the ground;	in the soil
Laphriinae	laid in shallow crevices or dead wood;	in dead wood
Asilinae	inserted in the ground or laid in sand;	in the soil
	deposited in slits, in bark, or old flower heads;	in dead wood
	laid in crevices along dead twigs.	in dead wood or twigs.

Variation in the shapes of the ovipositors is, no doubt, related to variation in egg deposition.

## 1. 5. HABITATS OF THE ADULTS

Habitats of some species of the Asilidae have been described. Melin (1923) studied the biology of the Asilidae of Sweden. James (1938) discussed the habitat preference of the Asilidae of Colorado, and Bromley studied the habitats of the adults of Connecticut (1946) and of Florida (1950). The following publications contain habitat data for certain groups: Wilcox and Martin (1936) for Cyrtopogon Loew; Melander (1923b) for Lasiopogon Loew; Baker (1939) for some species of robber flies from Coahuila, Mexico; Blanton (1939); and Cole (1916).





The robber flies are sun-loving insects of dry open areas. Habitats most commonly frequented are: dry fields, pastures, open bushy country, sandy areas, and edges of woods. According to Hull (1962), in desert or semidesert country, these flies are attracted to small streams, and in temperate regions, a few species occur in swampy areas and in deep forest. Bromley (1946) stated that asilids were practically absent from deep dark woods and swamps.

For the state of Colorado, James (1938) gave a list of five different habitats in which he found asilids. The grassland habitat had the greatest number of species, 36, representing nine genera. Bare areas and thickets were poor in Asilidae.

Bromley (1946) listed nine habitats for Connecticut. Seventeen genera containing 43 species were recorded from woodlands and bushy pastures. The species of bushy pastures were similar to those of the woodlands, but more abundant.

A list of habitats in which adults are collected consistently in Alberta follows:

- I. Grasslands:
  1. Pastures
  2. Semi-arid short grass prairie
  3. Beach grassland (close to lakes or rivers)
  4. Openings in the parkland forests.
- II. River banks and lake beach:
  1. Sandy
  2. Gravelly
- III. Woodland paths; trails or paths in the bush.
- IV. Sandpits or sand dunes.
- V. Coniferous forests:
  1. Openings in the forests, with grass, gravel or rocks, or streams.
  2. Edge of the forest.
  3. Trails or roads in the forest.





VI. Bare fields, including unpaved roads and newly ploughed fields.

Among these six habitats, grassland has the largest number of species, and only one species was collected from bare fields.

## 1. 6. DISTRIBUTION OF ASILIDAE IN ALBERTA

This section is a tentative study to find out the species communities for the bio-ecological regions. Each bio-ecological region of Alberta seems to have certain asilid species. These species are more or less limited in their distribution by the regional boundaries.

The zonation of the province of Alberta applied here is based on that of Moss (1955) and Brooks (1958).

### 1. 6. 1. Prairie

This zone or region is by far the richest in asilid species. Of 37 species recorded, 16 have not been found elsewhere in the province.

Lasiopogon terricola Johnson, L. quadrivittatus Jones, Stenopogon obscuriventris Loew, Eucyrtopogon albibarbis Curran, and Asilus gramalis new species, have also been found in the Parkland; Lasiopogon trivittatus Melander, Stenopogon inquinatus Loew, and Asilus erythrocnemius Hine, in the Boreal and the Boreal-Cordilleran Transition; while Holopogon albipilosus Curran, Lestomyia sabulorum Osten Sacken, Erax subcupreus Schaeffer, Asilus mesae Tucker, Asilus gramalis new species, Negasilus belli Curran, in the Subalpine and the Montane regions. On the other hand, some species, Cyrtopogon willistoni Curran, Bombomima columbica Walker, Laphria gilva L., and Leptogaster aridus Cole, may have been extending from the Subalpine and the Montane regions into the Prairie region.

Two species, Stenopogon inquinatus Loew and Cyrtopogon bimacula Walker, are more or less ubiquitous in Alberta.



### 1. 6. 2. Boreal forest

There are 17 species recorded from the Boreal forest, but the following species are limited to it: Holopogon nigripilosa n. sp., Bombomima posticata Say, Laphria scorio McAtee, Laphria aeatus Walker, Laphria index McAtee, and Asilus nitidifacies Hine. The species: Lasiopogon hinei Cole and Wilcox, Bombomima insignis Banks, and Laphria janus McAtee, have extended southward to the Parkland, and westward (except Bombomima insignis Banks) to the Boreal-Cordilleran Transition and Subalpine regions. Some other species present in the Boreal region may have been the result of "invasion" from the Prairie, such as Lasiopogon trivittatus Melander and Asilus erythocnemius Hine, or from the Subalpine or the Montane region, such as Cyrtopogon dasyllis Williston, Laphria sedales Walker, and Asilus callidus Williston. Cyrtopogon distinctitarsus n. sp. is found in the Boreal forest and in the Prairie.

From the data obtained, a tentative conclusion can be drawn, that the boreal forest is the common bio-ecological region of the first nine species mentioned above. This forest also serves as the "bridge" connecting the species found in eastern and western central North America, but absent from the Great Basin.

### 1. 6. 3. Subalpine and Montane regions

The Subalpine region is the second richest in the species of Asilidae in the province. Of 23 species recorded, only two are confined to this region: Cyrtopogon sansoni Curran and Cyrtopogon albovarians Curran. The remainder are elsewhere, mostly in the Montane region, with some other in the Boreal and the Prairie regions. Another species found here, Asilus erythocnemius, might have entered this zone from the Prairie region.





#### 1. 6. 4. Parkland and Boreal-Cordilleran

These regions are transitional. As one might have expected, asilids found here are a mixture of species from two or more regions.

In the Parkland region, the species are mostly from the Prairie region, while those in the Boreal-Cordilleran region, are mostly from the Subalpine or the Montane regions. The Boreal species seem to have extended equally to these two transitional regions.

### 1. 8. FEEDING HABITS

Without exception, all species of the Asilidae are predaceous in the adult stage. Food selection of this group, according to Hull (1962), has been studied considerably, by Hobby and Poulton for the British Asilidae, Carerra for South American species, and in North America, Bromley has studied intensively the prey of the Asilidae. However, according to James (1938), as far as food is concerned, the Asilidae are indiscriminate. Cannibalism has been reported in Diogmites angustipennis Loew by Alex (1936), and in Alberta, there is a cannibalistic tendency in Stenopogon inquinatus Loew. Cannibalism in association with courtship has been reported in Dasypogon diadema Fabricius by Poulton (1906).

These flies catch their prey by use of their long legs, long proboscis, and wings provided with strong muscles (Aaron, 1894).

The food is variable, including dragonflies, grasshoppers, Hemiptera, Hymenoptera, Coleoptera, Lepidoptera, and Diptera. Spiders as food have been reported by Bristowe (1924) and Bromley (1946).

### 1. 8. PREDATORS

The asilids have enemies: spiders, wasps, birds, lizards, mantids (Hull, 1962), and in very rare cases, the larvae of Cicindela Linnaeus. A species of red mite was



found attached to the external parts of some specimens of the species Lasiopogon cinereus Cole and L. trivittatus Melander.

### 1. 9. SEASONAL SUCCESSION OF SPECIES

Seasonal succession occurs in the adult Asilidae. Bromley (1934a) mentioned the occurrence of four distinct groups of the Asilidae, in Brazos County, Texas, according to the period or time of appearance.

Data from few Albertan localities are presented below:

#### 1. Emily Murphy Park, North Saskatchewan River, Edmonton.

	June, 1963				July, 1963			
	17	18	21	(26/1964)	2	3	4	(12/1964)
<u>Lasiopogon trivittatus</u>	-	-	-	2*	10	5	14	2
<u>Lasiopogon canus</u>	6	4	6	-	-	2	3	-
<u>Lasiopogon quadrivittatus</u>	-	6	2	-	2	1	2	-

#### 2. Writing-on-Stone Provincial Park, river bank.

	2 June 1964	3 August 1963
<u>Lasiopogon quadrivittatus</u>	18	-
<u>Stenopogon coyote</u>	-	6
<u>Proctacanthella cacopiloga</u>	-	8

#### 3. Writing-on-Stone Provincial Park, upper plain.

	2 June 1964	3 August 1963
<u>Lestomyia sabulorum</u>	10	-
<u>Leptogaster aridus</u>	-	1
<u>Erax bicaudatus</u>	-	3

\* Figures indicate the number of specimens.



## 4. Comrey, upper plain of Milk River Valley

	1 June, 1964	3 August, 1963
<u>Lestomyia sabulorum</u>	6	-
<u>Stenopogon neglectus</u>	-	11
<u>Stenopogon coyote</u>	-	7
<u>Erax bicaudatus</u>	-	8

## 5. Lake Newell, Kinbrook Island Provincial Park.

	10 June, 1964	6 August, 1963
<u>Asilus mesae</u>	12	-
<u>Asilus cumbipilosus</u>	4	-
<u>Asilus aridalis</u>	2	-
<u>Asilus gramalis</u>	2	-
<u>Asilus erythocnemius</u>	-	7

Although no conclusion can be drawn, there is slight indication, that in the southern parts of Alberta, the adults occur as two seasonal groups. The first group appears in early June. Included here are Lasiopogon quadrivittatus Jones, Lestomyia sabulorum Osten Sacken, Asilus mesae Tucker, Asilus cumbipilosus n. sp., Asilus aridalis n. sp., and Asilus gramalis n. sp. The second group appears in early August, and includes Stenopogon coyote Bromley, Stenopogon neglectus Bromley, Leptogaster aridus Cole, Proctacanthella cacopiloga Hine, Erax bicaudatus Hine, and Asilus erythocnemius Hine.





## 2. 0. TAXONOMIC TREATMENT

All of the subfamilies except the Megapodinae, which occurs only in the Neotropical Region (Hull, 1962), are represented in Alberta. Eighty five species of 23 genera were recorded. The Dasypogoninae is the largest subfamily: 11 genera with 49 species, followed by the Asilinae with 19 species in eight genera. The Laphriinae is represented by 15 species of three genera, while Leptogastrinae has only two species of Leptogaster Meigen.

### 2. 1. KEY TO THE SUBFAMILIES OF ASILIDAE OF ALBERTA

1. Abdomen slender and cylindrical (Fig. 102); second abdominal segment six times as long as first (Fig. 103); wings with alula greatly reduced or absent; hind femora club-shaped (Fig. 85) ..... Leptogastrinae
- Abdomen not slender, almost as broad as thorax (Fig. 87); second segment at most three times as long as first (Fig. 104); alula present; femora not club-shaped .....2
2. Wings with marginal cell open (Fig. 57) ..... Dasypogoninae
- Marginal cell closed (Fig. 161) .....3
3. Abdomen gradually tapering apically (Fig. 104); second segment three times as long as first; mediocubital crossvein of wings absent, or  $M_3$  and  $Cu_1$  fused for a short distance at the place of crossvein (Fig. 165) ..... Asilinae
- Abdomen, up to sixth segment, parallel-sided, or broader at the middle (Fig. 101); second segment subequal to first; wings with mediocubital crossvein present (Fig. 161) ..... Laphriinae

### 2. 2. SUBFAMILY DASYPOGONINAE

Ten tribes comprise this subfamily, of which the Stichopogonini, Stenopogonini, and Dasypogonini, are represented in Alberta.



The Stichopogonini is represented by Stichopogon Loew and Lasiopogon Loew; Stenopogonini by Stenopogon Loew, Ospricerus Loew, Holopogon Loew, Cyrtopogon Loew, Eucyrtopogon Curran, and Heteropogon Loew; Dasypogonini by Comantella Curran, Lestomyia Williston, and Nicocles Jaennicke.

Hull (1962) distinguished the Dasypogonini from the Stenopogonini by the presence of a bent spine at apex of the front tibia, and placed Comantella Curran in the former and Eucyrtopogon Curran in the latter. Based on some other characters, these two genera should be placed in the same group. Eucyrtopogon is more similar to Comantella Curran than to the rest of the Stenopogonini.

## 2. 2. 1. Key to the genera of Dasypogoninae of Alberta

1. Face bare, except on the oral margin (Fig. 3); gibbosity not conspicuous (Fig. 3); ocellar bristles absent; dorsocentrals absent (also in Lasiopogon terricola Johnson) ..... Stichopogon Loew
- Face with hairs or bristles between oral margin and at least halfway to antennal base (Figs. 5, 10); ocellars and dorsocentrals (except in Lasiopogon terricola Johnson) present ..... 2
2. Palpus one-segmented (Fig. 40); vertex with posterior margin at least twice as wide as front at antennal base (Figs. 7, 9) ..... Lasiopogon Loew
- Palpus two-segmented (Fig. 42); vertex not widened posteriorly, posterior margin at most one and half times as wide as front at antennal base (Figs. 15, 22)... 3
3. Head (including eyes) higher than wide (Fig. 14); front narrow, at most as wide as long; upper occiput behind eyes strongly convex ..... 4
- Head wider than high (Fig. 19); front wider than long; upper occiput behind eyes flat ..... 5
4. Third antennal segment with prominent excision on inner side (Figs. 123, 125)..  
..... Ospricerus Loew





- Third antennal segment without such excision..... Stenopogon Loew
- 5. Wings with branches of third longitudinal vein slightly distad of posterior crossvein (Fig. 156) ..... 6
- Branches of third longitudinal vein clearly proximad to posterior crossvein (Fig. 158) ..... 10
- 6. Dorsocentrals (at least behind mesonotal suture) and scutellars present; front forming an almost right angle with vertex ..... 7
- Dorsocentrals and scutellars absent; front almost horizontal, slightly arched, not forming sharp angle with vertex ..... 9
- 7. Humerals absent ..... Nicocles Jaennicke
- Humerals present ..... 8
- 8. Metapleuron pilose or with bristles; third antennal segment tapering apically (Fig. 130); no bent spine on apex of front tibia ..... Heteropogon Loew
- Metapleuron bare; third antennal segment dilated subapically (Fig. 128); apex of front tibia with a bent spine ventrally ..... Lestomyia Williston
- 9. Hind basitarsus and hind tibia swollen distally (Fig. 84); face almost flat (Fig. 16); mesopleuron pilose ..... Holopogon Loew
- Hind basitarsus not swollen, hind tibia slender (Fig. 79); gibbosity rounded; mesopleuron with stiff hairs ..... Cyrtopogon Loew
- 10. Front tibia with curved spine at apex ventrally (Fig. 77) ..... Comantella Curran
- Front tibia without such a spine ..... Eucyrtopogon Curran

### 2. 2. 2. Genus Stichopogon Loew

Stichopogon Loew, 1847: 499. Type species: Dasypogon elegantulus Wiedemann.

Stilopogon Costa, 1883: 62. Type species: Stilopogon aequicinctus Costa.

Neopogon Bezzi, 1910a: 147. Type species: Dasypogon trifasciata Say

Lissoteles Bezzi, 1910b: 177. Type species: Lissoteles hermanni Bezzi.



The genus Neopogon Bezzi was considered as a different genus from Stichopogon Loew by Hull (1962) on the basis of the characteristics of the chaetotaxy, the palpi, the vertex, and the body size. Curran (1934) recognized only one genus under the name Neopogon Bezzi. Both Hull and Curran treated Lissoteles Bezzi as a different genus from Stichopogon Loew. Hull further added three subgenera to the genus Stichopogon (s. s.), namely Dichropogon Bezzi, Echinopogon Bezzi, and Cryptopogon White. Bromley (1951) considered Neopogon Bezzi, Lissoteles Bezzi, Echinopogon Bezzi, and Dichropogon Bezzi, as synonyms of Stichopogon Loew.

Two species of this genus, argenteus Say and trifasciatus Say, are known from Alberta.

#### 2. 2. 2. 1. Key to the species of Stichopogon of Alberta

- Uniformly silvery pollinose; mesonotal and abdominal pile long; bristles on first abdominal segment weak, hardly distinguishable from pile ... argenteus Say
- Abdomen with black markings on dorsum of second, third, fifth, and sixth segments; mesonotum with short suppressed hairs; bristles on first abdominal segment strong and distinct ..... trifasciatus Say

#### 2. 2. 2. 2. Stichopogon argenteus Say

Dasypogon argenteus Say, 1823: 51; 1869: 65.

Stichopogon argenteus Back, 1909: 334.

This species is easily recognized by its uniform silvery color of the pollen and the hairs.

Description - Antennae brownish black, bristles present on lower sides of first two segments, and upper side of second segment; face flat with slight elevation above epistoma (Fig. 2); mystax of few rows; palpus one-third as long as labium, pilose sub-basally; proboscis with basal one-third of lower side silvery pollinose, basal half pilose.





Thoracic pile long; scutellum with long hairs along posterior margin; one presutural, one postalar, and a row of metapleural bristles present.

Legs with pile on anterolateral side of front coxa, on lateral of middle coxa and hind coxae, and lower sides of femora; bristles present on tibiae and tarsi; last tarsal segment, empodium, and pulvilli of equal length, claws slightly longer than last tarsal segment.

Wings clear, evenly covered with microtrichiae; mediocubital vein absent,  $M_3$  and  $Cu_1$  fused for a short distance.

Abdomen elongate, pile longest on first two segments; ventral pile absent from first segment, shorter in females.

Variation - Slight variation occurs among the specimens, in the length of the first segment of the style and the length of the fusion of  $M_3$  and  $Cu_1$ .

Distribution - The presence of this species in Alberta is doubted, but Strickland (1938) included it in his list. It has been recorded from Manitoba to Colorado, west to California, east to New York, south to Maryland.

Number of specimens examined - 22.

Localities - MANITOBA: Onah (CNC). ONTARIO: Grand Bend (CNC). NEW YORK: Oak Beach, Long Island (UA); Fire Island (AMNH); New York City (USNM). NEW JERSEY: Avalon (USNM); Sea Side Park (USNM). ILLINOIS: Lake Forest (USNM). KANSAS: Medora (USNM). CALIFORNIA: Los Angeles.

### 2. 2. 2. 3. Stichopogon trifasciatus Say

Dasypogon trifasciatus Say, 1823: 51; 1869: 64.

Dasypogon candidus Macquart, 1846: 67.

Dasypogon fasciventris Macquart, 1850: 69.

Dasypogon gelascens Walker, 1860: 277.

Stichopogon trifasciatus Williston, 1886: 289.





This species is easily distinguished from argenteus Say, by the characters in the above key.

**Description** - Antennae with bristles on lower sides of first two segments, and apical upper side of second; front and vertex golden yellow pollinose; face pale yellow pollinose; mystax white, single row, along upper margin of epistoma; palpus one-fifth as long as labium; proboscis black, with silvery white pollen on basal half of lower side.

Thoracic pile sparse, absent from mesonotum; the latter provided with semi-appressed short black hairs; one presutural, one postalar, a row of six metapleural bristles present.

**Legs** with sparse pile; bristles present on apices of femora, on tibiae, and on tarsi.

Wings clear, evenly covered with microtrichiae; veins brown; mediocubital cross-vein present, short.

Abdomen silvery white pollinose, with triangular black markings on second, third, fifth, and sixth segments, with apices facing forward (Fig. 87); pile very sparse, short, but longer on side of first segment.

**Variation** - The antennae and the mediocubital crossvein vary slightly.

**Ecological notes** - This species seems to prefer bare areas, including exposed rocks, wind blown areas, and stream sides (James, 1938), open beach, sand plains, restricted sandy or gravelly areas (Bromley, 1946), and also pastures or bare fields (including unpaved roads) near streams.

**Distribution** - This species is widely distributed in the United States and Canada.

**Number of specimens examined** - 63.

**Localities** - ALBERTA: Edgerton; Medicine Hat (UA).

**Other localities** - MANITOBA: Aweme; Onah (CNC). CALIFORNIA: San Diego Co. (CNC). ARIZONA: Madera Canyon, St. Rita (UA). NEW MEXICO: Silver City (UA). TEXAS: Brazos; Madison; Frio; Bexar; Travis; Burleson. WYOMING: New Castle, Weston Co. (AMNH). NEBRASKA: Broken Bow (AMNH). IOWA: Iowa City (AMNH); Ames (AMNH). ONTARIO: Point Pelee (UA CNC); Orilla (UA); Grand



Bend (CNC). QUEBEC: Hull (CNC). NEW YORK: Long Island (AMNH).

### 2. 2. 3. Genus Lasiopogon Loew

Lasiopogon Loew, 1847: 508. Type species: Dasypogon pilosellus Loew.

Daulopogon Loew, 1874: 377.

This genus and Stichopogon Loew are grouped in the tribe Stichopogonini (Hull, 1962). Specimens of both genera have a complete prosternum (Fig. 66), wide front and vertex (Fig. 9), but they are distinguished by the shape of the gibbosity and the mystax (Fig. 8).

Description - Antennae with abundant strong hairs on lower sides of first two segments and apical upper side of second; third segment with apical style (Figs. 118-121); ocellar bristles present; palpus one-segmented; left and right cardostipites separate, held together by membrane; upper half of occiput usually with bristles, at least present behind orbital margin as continuation of verticals; bristle-like hairs present on frontovertex, except in trivittatus Melander and terricola Johnson.

Bristles on thorax mostly on mesonotum; dorsocentrals absent from terricola Johnson; metapleuron always with a vertical row of bristles; short or longer bristle-like hairs on humeri; posterior margin of mesopleuron with long bristle-like hairs, except in trivittatus Melander and terricola Johnson; pale pile on upper posterior corner of sternopleuron.

Bristle-like hairs present on anterior side of front coxa, lateral side of middle coxa, and sparsely on hind pair; femoral bristles if present, subapical; tibial bristles arranged in five rows, nine to 11 subapical bristles also present; tarsal bristles arranged circularly on subapical ends.

Wings hyaline, evenly covered with microtrichiae; marginal cell open, two submarginal cells always present, open; four posterior cells always open; anal cell always closed; anterior crossvein always before middle of discal cell.







Sides of first abdominal segment usually with bristles and pale pile; male genitalia rotated 180°, bristles present on hypandrium; ovipositor with acanthophrites and spines, valves of eighth sternum prominent (Figs. 106, 107).

Nine species of this genus are present or listed as occurring in Alberta. The record of one of them, ripicola Melander, is doubted, while prima is described as a new species.

### 2. 2. 3. 1. Key to the species of Lasiopogon Loew of Alberta

1. Mystax entirely white ..... 2
- Mystax entirely black or mixed black and white ..... 5
2. Dorsocentrals and scutellars absent ..... terricola Johnson
- Dorsocentrals and scutellars present ..... 3
3. Scutellars white ..... quadrivittatus Jones
- Scutellars black ..... 4
4. Two scutellars (Fig. 67); mesonotum with few setulae; metapleural bristles  
white ..... trivittatus Melander
- Scutellar bristles numerous (Fig. 68); mesonotum with more or less numerous long  
hairs ..... ripicola Melander
5. Mystax mixed white and black ..... prima n. sp.
- Mystax entirely black ..... 6
6. Apical abdominal bands absent; pollen if present, not forming definite  
bands ..... hinei Cole and Wilcox
- Pollinose apical bands present and definite ..... 7
7. Abdominal bands golden yellow, less than one-fourth of corresponding abdominal  
segments, the rest of segment more or less shining black ..... canus Cole and  
Wilcox
- Abdominal bands greyish, wider than one-fourth of corresponding segments,  
the rest of segment mostly brown ..... 8



8. Male ..... 9  
 - Female ..... 10
9. Genitalia with superior forceps (surstyli) broad, length less than twice the width; hypandrial bristles convergent ..... aldrichi Melander  
 - Superior forceps with length four times the apical width (Fig. 180); hypandrial bristles more or less parallel ..... cinereus Cole
10. Ovipositor not entirely black, valve of eighth sternum orange ..... aldrichi Melander  
 -- Ovipositor entirely black ..... cinereus Cole

## 2. 2. 3. 2. Lasiopogon terricola Johnson

Daulopogon terricola Johnson, 1900: 326.

Lasiopogon terricola Back, 1909: 300-301.

Alexiopogon terricola Curran, 1934: 183.

Curran (1934) separated this species from the rest of Lasiopogon Loew, and erected a new genus for it, Alexiopogon. However, the following characters of this species show that it belongs in Lasiopogon Loew: the shape of the gibbosity and the mystax, the size of the front and vertex, the presence of the ocellar and the occipital bristles, the presence of the long sparse pile on the vertex, the presence of the short hairs on the humerus, the mouthparts, the male genitalia, and the ovipositor.

Description - Front and vertex widened posteriorly, golden yellow pollinose, with a pair of parallel grooves, convergent toward neck (Fig. 7); bristles on head pale yellowish; face pale yellowish pollinose.

Thorax golden yellow pollinose, paler on pleura; one or two presuturals, one or two intraalars, one or two postalars, black; metapleural bristles pale yellowish; dorsocentrals and scutellars absent; mesonotum with a pair of brownish vittae and short semi-appressed pale yellow hairs.





Legs brownish; coxae black, pollinose; femora black dorsally; tibiae with pale yellowish hairs and pale and black bristles; tarsi with black bristles; claws reddish brown basally, black apically; empodium black; pulvilli yellow.

Wings slightly longer than abdomen; veins brownish.

Abdomen shiny black, reddish brown apically; very short, sparse, appressed pale hairs present; side of first segment with weak bristles or bristle-like hairs; male genitalia reddish, hypandrial bristles pale yellow, convergent; ovipositor reddish brown.

Ecological notes - This species is found on the low damp ground (Johnson, 1900; Cole and Wilcox, 1938) as well as on dry sand bars or bare sand dunes.

Distribution - This species ranges from Alberta to Massachusetts, south to Virginia.

Number of specimens examined - 69.

Localities - ALBERTA: Fabyan (UA); Wainwright (UA); Provost (UA); Manyberries-Orion (UA); Writing-on-Stone Provincial Park (UA); Lethbridge, Oldman River (UA); Medicine Hat.

Other Localities - NORTH DAKOTA: Mott (CNC). INDIANA: Bare Sand, Lafayette. OHIO: Pine Creek, Hocking Co. VIRGINIA: Great Falls. MARYLAND: Plummer's Island; Beltsville. NEW JERSEY: Clementon; Lahaway, Ocean Co.; Riverton; Wenonah. MASSACHUSETTS: Amherst; Chicopee.

### 2. 2. 3. 3. Lasiopogon trivittatus Melander

Lasiopogon trivittatus Melander, 1923b: 144-145.

Males of this species are described for the first time, below:

Description - Vertex golden yellow pollinose; short stiff hairs present as a row of three to four between grooves and orbital margin, and two pairs in front of ocellar plate; ocellars black; occiput yellowish grey pollinose, occipital bristles on





upper margin and transversely behind vertex; mystax pale yellow; antennae black, hairs on lower and apical upper sides of first two segments black; proboscis black, pile on lower basal half white; beard white.

Prothorax golden yellow pollinose, paler toward ventral sides; pile on pronotum, on episternum, and on epimeron, pale yellowish; mesonotum grey to yellowish pollinose; dorsocentral and acrostichal vittae present, complete; presutural, intraalar, and postalar bristles always single; presutural dorsocentrals in most cases two, rarely one; posthumeral sometimes present; postsutural dorsocentrals always two; setulae present on mesonotum in front of suture; scutellars black, two, sometimes with two black and few white setulae; metapleurals pale yellowish.

Legs grey pollinose; coxal hairs pale yellowish; lower sides of femora with pale bristles and pile; tibial and tarsal bristles black, absent from ventral surfaces; claws brown, tips black; empodium black.

Wings hyaline, evenly covered with microtrichiae; anterior crossvein at basal one-third or half of the length of discal cell; anal cell closed.

Abdomen brownish pollinose basally, posterior one-third to half greyish pollinose, extending forward on lateral margins, sides of first segment with bristles and sparse pile; appressed setulae on all abdominal segments; male genitalia (Figs. 175–179), black, yellowish grey pollinose; hypandrial bristles convergent.

Females - Ovipositor black, spines black, valves orange.

Variation - Number and color of bristles and setulae, and total length (6.0 - 9.0 mm) vary. In very rare cases, one or two black bristles are present among white mystax.

Ecological notes - The specimens of this species are abundant along river banks, often resting on rocks. Red mites were found attached to the ventral side of neck and behind the hind coxae (membraneous parts) of a female specimen from Luscar, Alberta (UA). Another species, Lasiopogon cinereus Cole, collected from the same locality, was also found to have the same species of mites associated with it.



Lasiopogon trivittatus Melander in some localities, is associated with L. cinereus Cole and L. quadrivittatus Jones.

Distribution - This species has been recorded from Montana and Alberta.

Number of specimens examined - 148.

Localities - ALBERTA: Flatbush, Pembina River (UA); Edmonton, Emily Murphy Park (UA), Beverly Municipal Dump (UA and LMK); Luscar, McLeod River (UA); Red Deer River, Red Deer (UA and LMK); Drumheller (UA); Dinosaur Park (UA); Nordegg, North Saskatchewan River Valley (UA and LMK); Crowsnest Forest, Dutch Creek (UA); Banff, Eisenhower lookout (CNC).

Other localities - MONTANA: Gold Creek.

#### 2. 2. 3. 4. Lasiopogon quadrivittatus Jones.

Lasiopogon quadrivittatus Jones, 1907: 278.

Among the species of Lasiopogon Loew occurring in Alberta, this is the most easily recognized, for the bristles are all pale. In general appearance it is similar to ripicola Melander, but the latter has black scutellar bristles.

Description - Face and lower occiput grey pollinose; front vertex, and upper occiput yellowish pollinose; bristles and hairs pale yellowish.

Thorax golden yellow pollinose; dorsocentral vittae rusty brown, with golden orange lining; acrostichal vitta grey or golden yellow; space between dorsocentral and acrostichal vittae brownish, giving appearance of four vittae; six dorsocentrals, two to three before suture; posthumeral present or absent; presuturals two to three; intraalars two; postalars two; scutellars six; mesopleural and sternopleural pile white; metapleural bristles five to eight.

Legs light yellowish pollinose; middle and hind pairs less pilose; hind femora with a row of bristles on anterior sides; claws reddish brown basally, black apically;





empodium black.

Wings hyaline, vein brownish; fourth posterior cell open, narrower or wider than the first; anal cell closed.

Abdomen grey pollinose; bristles and pile pale yellowish; a pair of basal semicircular brown markings on each, except first segment; male genitalia black, golden yellow pollinose, hairs and bristles pale yellowish; hypandrial bristles convergent; ovipositor black, yellowish pilose.

Variation - Total length (7.0 - 10.0 mm) in males, and (8.0 - 11.5 mm) in females; number of metapleural and mesonotal bristles exhibit variation.

Ecological notes - In southern Alberta this species is common in late spring, but it appears later in the northern parts of the province. It has been found associated with Lasiopogon terricola Johnson, L. trivittatus Melander, L. canus Cole and Wilcox, Eucyrtopogon albibarbis Curran, and Asilus aridalis n. sp.

This species inhabits several different habitats: bare paths, along river banks, and sand dunes near river.

Distribution - This species ranges from Alberta and Wyoming, east to Nebraska.

Number of specimens examined - 134.

Localities - ALBERTA: Edmonton, Beverly Municipal Dump (UA and LMK), Country Club (LMK), Emily Murphy Park (UA), White Mud Park (UA); Fabyan, Campsite (UA); Bindloss (UA); Empress (UA); Sandy Point Bridge (UA); Army Expt. Sta. (UA); Medicine Hat (UA; CNC); Seven Persons (UA); Burdett (UA); Pendant d'Oreille (UA); Writing-on-Stone Provincial Park (UA); Milk River (CNC); Lethbridge (UA; CNC); Taber (UA); Dinosaur Park (UA); Drumheller (UA); Calgary (CNC).

Other localities - MONTANA: "Montana, C. U.". WYOMING.  
NEBRASKA: Halsey War Bonnet Canyon; Bad Lands; Mouth of Monroe Canyon.  
NORTH DAKOTA: Bismarck.



2. 2. 3. 5. Lasiopogon ripicola Melander.

Lasiopogon ripicola Melander, 1923b: 143-144.

This species is similar to Lasiopogon quadrivittatus Jones, but is distinguished by the black color of the scutellar bristles; the male genitalia are also different.

The presence of this species in Alberta is doubted, but it was included by Strickland (1946) in his list.

Distribution - This species ranges from Washington and Idaho to California.

Number of specimens examined - 7.

Localities - WASHINGTON: Wayawai (CNC); Pasco (USNM); Cashmere.  
IDAHO: Lewiston. OREGON: The Dalles.

2. 2. 3. 6. Lasiopogon cinereus Cole.

Lasiopogon cinereus Cole, 1919: 229.

This species is distinguished from the other by the following characters: the black mystax, the wide grey bands on the abdominal posterior sides, the shape of the superior forceps of the male genitalia (tapering apically), and the entirely black ovipositor.

Description - Face grey pollinose, mystax as long as antenna; front and vertex yellowish tinged; frontal and vertical hairs weak; brownish transverse band across lateral ocelli; antennae black, first two segments with black hairs.

Thorax grey pollinose; prothorax yellowish pilose; mesonotal hairs black, long; dorsocentral bristles weak, two before suture, three to four behind suture; two to three presuturals; posthumeral present or absent; humeri yellowish tinged, black hairs present; mesopleuron with hairs on front half of upper margin and posterior upper corner, pale yellow pile present on posterior corner of sternopleuron; metapleural bristles black, mixed with white pile; scutellum yellowish grey pollinose, bristles black.





Legs average for the genus, with long pale pile on lower sides of femora; bristles black.

Wings hyaline, slightly infuscated; halteres brownish.

Basal three-quarters of abdominal segments rusty brown pollinose, apical one-fourth grey pollinose; long pale yellowish pile present on lateral sides of first four of male and first two of female abdominal segments; last four segments of males and last five segments of females with black setulae; bristles present on sides of first segment; venter long yellowish pilose; male genitalia (Figs. 180-184) black, superior forceps yellowish grey pollinose, black haired; hypandrial bristles black, convergent; ovipositor black, sparsely yellowish pilose, spines black.

Ecological notes - It has been found associated with Lasiopogon trivittatus Melander. The adults are active, flying from rock to rock in the river, or along river banks.

Distribution - This species ranges from Alberta to California, east to Utah and Colorado.

Number of specimens examined - 51.

Localities - ALBERTA: Nordegg, North Saskatchewan River (LMK); Luscar, McLeod River (UA); Red Deer (UA); Crowsnest Forest, Wilkinson Creek (UA), Dutch Creek (UA); Banff (CNC); Frank (CNC); Waterton (CNC); Blakiston Brook, Waterton Park (UA).

Other localities - WASHINGTON: Blewett; Buckley; Cle Elum; Gaynor; Goldendale; Kalama River; Lake Cushman, Mason Co.; Mt. Rainier, Ipsut Creek Camp, Old White River Entrance; Naches; Rainier National Forest, Indian Flat Camp, Lodgepole Camp; Satus Creek; Virden; Walla Walla (CNC). OREGON: Mehama (AMNH); Hood River; Joseph; Lebanon; Wallowa Lake. CALIFORNIA: Tuolumne Meadows, Yosemite Park. MONTANA: edge of Musselshell River, Winnecook. WYOMING: near Lander; Thumb Station, Yellowstone National Park. UTAH: Uinta Mountains; Duchesne Mountain;





Sheep Creek, Duchesne Co. COLORADO: Rockwood (USNM).

2. 2. 3. 7. Lasiopogon prima new species

This species is readily distinguished from the rest of the Albertan species by the color of the mystax, which is mixed black and white. The male genitalia are also diagnostic of the species; the superior forceps (surstyli of Cole) are provided with disc-like projections on the inner sides (Fig. 187).

Description - Male. Face greyish yellow pollinose; lower side of mystax white, upper side black; front and vertex dull greyish yellow pollinose; fronto-orbital hairs two rows; hairs in front of ocellar plate black, abundant; ocellar bristles black; upper half of occiput dull greyish yellow pollinose, lower half greyish pollinose; antennae black (Fig. 119); hairs on first two segments black; style half as long as third segment; proboscis black, pile on basal half of lower side black; palpus black, one-eighth as long as labium.

Prothorax brownish grey pollinose, white pilose; mesonotum greyish pollinose, dorsocentral vittae brown, acrostichal vitta faint, ended at mesonotal suture, lateral mesonotal margins brownish; hairs and bristles black; four left and three right presuturals, one left and two right intraalars, one pair postalar, six pairs presutural dorsocentrals, three left and unidentified right postsutural dorsocentrals; scutellum black, greyish pollinose, eight bristles black, mixed with black hairs; mesopleuron yellowish grey pollinose, paler on lower side, black hairs on upper posterior corner; upper posterior corner of sternopleuron whitish pilose; a row of eight metapleural bristles black.

Legs black, average for Lasiopogon Loew; pile on coxae, on femora, and on tibiae white; left front femur with two, right front femur with four bristles on dorsoposterior surface, two bristles on middle pair, a row of six on left and five on right anterior side of hind femora; front and hind tibiae with three rows of four bristles on dorsal surfaces, middle pair with four rows; tibiae with nine to twelve apical bristles;



tarsal bristles arranged in circle subapically; claws brown basally, black apically; pulvilli tawny, empodium black, as long as pulvilli.

Wings hyaline, evenly covered with microtrichiae, veins brown; anterior crossvein at middle of discal cell; fourth posterior cell open, as wide as first, fifth three times as wide as fourth; anal cell closed at margin (Fig. 148).

Abdomen shining black, yellowish grey pollinose on apices, extending forward at sides and middle, leaving a pair of black spot on each segment; yellowish white pile on lateral sides of first four segments, semiappressed on the rest, venter grey pollinose, white pilose; male genitalia black, hypandrial bristles black, convergent, superior forceps broad basally, tapering apically, with disc-like projection on ventral inner side (Fig. 187).

Females - Except for the number and position of the bristles, females of this species are similar to the males; bristles on first abdominal segment mixed with black; last four segments with setulae on lateral sides; ovipositor black.

Variation - This species varies individually in the number of bristles, especially those on the mesonotum, the position of the anterior crossvein, and the width of the fourth posterior cell. Total length is from 7.0 - 9.0 mm.

Ecological notes - The habitat is the same as that of the other species of Lasiopogon Loew.

Holotype: male, Nordegg, North Saskatchewan River Valley, Alberta, 28-V-1963 (Adisoemarto, Freitag, Ball, collectors); deposited in CNC.

Paratypes: one male, three females, same data; male, female, North Saskatchewan River, near Rocky Mountain House, Alberta, 29-V-1963, same collectors; one male, three females, Garth, Alberta, same date, same collectors; male, Brazeau Dam, Lodgepole, Alberta, 9-VII-1964 (L. M. Kenakin). All these localities are on the eastern slopes of the Rocky Mountains, in the vicinity of the North Saskatchewan River. Except the last specimen, kept in LMK collection, the paratypes are deposited







in UA collection.

The name prima has been chosen, because this species was the first asilid collected in 1963, on an expedition to the Rocky Mountains.

## 2. 2. 3. 8. Lasiopogon canus Cole and Wilcox.

Lasiopogon canus Cole and Wilcox, 1938: 32-34.

According to Cole and Wilcox (1938), this species in general appearance resembles European members of the genus rather than North American species. This species is distinguished from the other by the black mystax and the narrow golden yellow abdominal bands.

Description - Face, front, and vertex golden yellow pollinose; hairs and bristles black; hairs in front of ocellar plate weak; antennae and hairs on first two segments black; occiput golden yellow pollinose, paler toward chin, bristles black; beard yellowish white.

Thorax golden yellow pollinose; dorsocentral vittae brown, not reaching humeri, acrostichal vitta faint, incomplete; bristles and hairs entirely black.

Legs golden yellow pollinose; coxae greyish pollinose; pile entirely golden yellow.

Wings hyaline, brownish, covered with microtrichiae; fourth posterior cell varies from closed to widely open; anal cell closed with stalk.

Abdomen black, slightly golden yellow pollinose, pile yellow; in some specimens, last three segments with black setulae on lateral sides; male genitalia shining black, superior forceps broad basally, tapering apically, bristles black, convergent on hypandrium; ovipositor with orange valves, but comparatively shorter and broader than those of aldrichi Melander.

Variation - The bristles on the sides of the first abdominal segment vary in number, from six to eight, and are all black, or black mixed with white.



Ecological notes - The species is found on bare paths or gravelly river banks. Few specimens, which were probably just emerged, have the male genitalia not completely inverted or still in uninverted situation. These specimens are kept in UA.

Distribution - This species is known from Alaska and Alberta.

Number of specimens examined - 32.

Localities - ALBERTA: Rocky Mountain House, North Saskatchewan River (UA); Edmonton, Whitemud Park (UA), Emily Murphy Park (UA), Country Club (LMK).

Other localities - ALASKA: Savonoski, Naknek Lake; Healy; Fairbanks.

## 2. 2. 3. 9. Lasiopogon hinei Cole and Wilcox

Lasiopogon hinei Cole and Wilcox, 1938: 51-53.

This species is recognized by the obscure abdominal pollen, not arranged as apical bands, and also by the long and dense pile on the abdomen of the males.

Description - Face, front, and vertex yellow pollinose; frontal and vertical hairs long, black, abundant, continued to occiput; occiput greyish pollinose; proboscis black, pile yellowish, palpus black, yellowish pilose.

Prothorax pale yellowish grey to golden yellow pollinose, pile yellowish; mesonotum golden yellow pollinose, dorsocentral vittae brownish to velvety black with golden yellow lining on inner sides, acrostichal vitta paler, greyish or golden yellow, incomplete, space between dorsocentral and acrostichal vittae brownish; dorsocentral bristles weak, varying from five to eight (two to three presutural, and three to five postsutural); posthumeral present or absent; two to three presuturals; two to three intraalars; two pairs of postalars; usually eight scutellars, sometimes hardly distinguishable from hairs; metapleural bristles eight to nine in a row, black, mixed with pale yellowish pile.

Legs golden yellow pollinose; numerous long black bristles present on apical halves of femora and tibiae; claws brownish basally, black apically.





Wings hyaline, slightly infuscated; fourth posterior cell as wide or half as wide as first; anal cell always closed, with stalk.

Ground color of abdomen black, pollen yellowish grey; long yellowish pile present on first four abdominal segments of males or first three of females, the rest segments with brownish black hairs; bristles on first abdominal segment pale yellowish, on male genitalia black; hypandrium orange, bristles convergent; ovipositor black, spines black, valves brownish orange.

Variation - The number of bristles on the mesonotum varies.

Ecological notes - The adults of this species, in Alberta, have been found along bare paths near streams or rivers with grasses or bushes next to them.

Distribution - This species is known from Alaska and Alberta.

Number of specimens examined - 14.

Localities - ALBERTA: Flatbush, Pembina River (UA); Edmonton, Rainbow Valley (UA), Whitemud Park (UA); Rocky Mountain House, North Saskatchewan River (UA).

Other localities - ALASKA: Katmai.

## 2. 2. 3. 10. Lasiopogon aldrichi Melander.

Lasiopogon aldrichi Melander, 1923b: 139-140.

The females of this species and of canus Cole and Wilcox have orange valves of the ovipositor, but they are distinguished from one another by the difference in shape. The males of this species is recognized by the shape of the superior forceps.

Variation - Slight variation occurs in the shape of the third antennal segment (Figs. 120, 121). The number of mesonotal bristles varies. The fourth posterior cell varies from completely closed to widely open. A female specimen from Drumheller (UA), Alberta, is slightly different from the other specimens with respect to the shape of the ovipositor (Fig. 107). This specimen might belong to Lasiopogon pacificus Cole and





Wilcox.

Distribution - This species ranges from British Columbia and Alberta to California, east to Utah and Colorado.

Number of specimens examined - 48.

Localities - ALBERTA: Banff (UA and CNC); Drumheller (UA).

Other localities - BRITISH COLUMBIA: Robson (CNC). OREGON: Mt. Hood (USHM); Anthony Lake; Blue Mountains, Tollgate; Fish Lake, Steins Mts.; Haines; Strawberry Mt., Grant Co; Sumpter; Wallowa Lake, Aneroid Lake Trail. WASHINGTON: Blue Mts.; Signal Peak; White Rock Springs, Steven Pass, Cascade Mts.; Mt. Spokane (USHM). IDAHO: Moscow Mt. (CNC); Long Valley, Alpha. WYOMING. COLORADO: La Veta Pass. UTAH: Beaver Creek. CALIFORNIA: Samoa (USNM).

#### 2. 2. 4. Genus Stenopogon Loew.

Stenopogon Loew, 1847: 483. Type species: Asilus sabaudus F., 1794.

Scleropogon Loew, 1866: 26. Type species: Scleropogon picticornis Loew, 1866.

This genus contains robust species. Curran (1934) and Hull (1962) considered this genus (sensu stricto) different from Scleropogon Loew, on the base of the absence of pile or hairs from the metapleuron. The definition was thought by Bromley (1937) as trivial; he (1951) treated Scleropogon Loew as synonym of Stenopogon Loew. Back (1909) was the first to consider these two groups as congeneric.

Description - Head slightly higher than wide; face, front, and vertex narrow; gibbosity of two types: in "inquinatus group" gibbosity very prominent, starting from close to antennal base (Figs. 12, 13), in "coyote group", gibbosity starting farther away (Fig. 11), third antennal segment tapers apically, without obvious apical excavation (Fig. 126); style tapers apically.



Prothorax with bristles, pile present among bristles and on anterior corner of sternopleuron and posterior one-third of sternopleuron; bristles or hairs present on, or absent from, metapleuron; mesonotal bristles more abundant on posterior half.

Legs pilose; front femora with bristles on apices, middle pair with a row of bristles on anterior sides, hind pair with two rows on anterior sides; tibiae with three or four rows of bristles; tarsi with bristles subapically.

Wings hyaline, axillary cell and alula fuscous or smokey; second and third veins slightly recurved; anterior crossvein at, or slightly before, middle of discal cell; fourth posterior cell open or closed; anal cell closed or narrowly open (Figs. 150, 151).

Abdomen more or less cylindrical, elongate, tapering apically; male genital organ not inverted (Fig. 93); ovipositor with acanthophorites and spines (Figs. 89–92.)

According to the definition of the genus Ospriocerus Loew by Martin (pers. comm.), consanguineus Loew and pumilus Coquillett belong to that genus, not to Stenopogon Loew.

There are five species in Alberta: obscuriventris Loew, rufibarbis Bromley, inquinatus Loew, coyote Bromley, and neglectus Bromley, but Strickland (1938 and 1946) included also gratus Loew in his lists.

#### 2. 2. 4. 1. Key to the species of Stenopogon Loew of Alberta.

1. Metapleuron with hairs, or with weak or strong bristles ..... 2
- Metapleuron without hairs or bristles, at most tomentose or pollinose ..... 3
2. Wings with first and fourth, posterior cells open; abdomen blackish or less pollinose; first antennal segment blackish ..... neglectus Bromley
- First posterior cell narrow at tip or sometimes closed with stalk (Figs. 150, 151); fourth posterior cell closed with stalk; abdomen greenish grey pollinose; first antennal segment brownish orange ..... coyote Bromley
3. Abdominal dorsum uniformly black ..... 4





- Abdominal dorsum reddish brown, black only on sides ..... 6
- 4. Humeri orange brown ..... inquinatus Loew
- Humeri black ..... 5
- 5. Evenly greyish pollinose species; pile and bristles yellow ..... obscuriventris Loew
- Darker, bright orange pollinose; pile and bristles bright orange .... rufibarbis Bromley
- 6. Humeri orange-brown, covered with greyish pollen ..... inquinatus Loew
- Humeri black, covered with yellowish orange pollen ..... gratus Loew

#### 2. 2. 4. 2. Stenopogon obscuriventris Loew.

Stenopogon obscuriventris Loew, 1872: 30.

Specimens of this species are easily recognized by their uniform greyish pollen and yellow bristles and pile. Back (1909) treated this species as conspecific with californiae Walker.

Description - Antennal segments unicolored; style orange brown apically; palpal segments equal (Fig. 42); gibbosity almost touching antennal base (Fig. 12).

Thorax unicolored; prothorax with bristles only on pronotum; presutural dorsocentrals absent; humerals absent; dorsocentral vittae blackish brown; pile on anterior corner and posterior half of sternopleuron long.

Coxae and basal three fourths of femora black, the rest yellowish; claws brownish basally, black apically.

Wings hyaline, veins brownish; in males, axillary cell and alula tinged silvery white, less obviously so in females; all posterior cells open; anal cell open narrowly or almost closed.

Abdomen unicolored; pile on first three segments long; male genitalia (Figs. 194-198) and ovipositor orange brown.

Variation - Number of bristles varies. Sexual dimorphism is shown only by the white infuscation on the wings of the males.



Distribution - This species ranges from Alberta and Colorado, west to California.

Number of specimens examined - 23.

Localities - ALBERTA: Czar (UA); Medicine Hat (CNC); Lethbridge (CNC).

Other localities - SASKATCHEWAN: Pike Lake; Great Sand Hills, west of Swift Current. OREGON: Summer Lake; Chewaucan R., near Paisley. IDAHO: Victor (AMNH); Giveout (AMNH); Mt. Pelier (AMNH). WYOMING: Jackson (AMNH); Rawlins (AMNH); Green River (AMNH); Medicine Bow (AMNH); Carbon (AMNH); Rock Spring (AMNH); Centennial (AMNH). UTAH: Promontory Point (USNM); Huntsville (USNM); Logan Canyon (USNM). COLORADO: Animas (AMNH); Monte Vista (AMNH); Ouray (AMNH); Jefferson (AMNH); Blanca (USNM). ARIZONA: Kaibab Forest, Grand Canyon. CALIFORNIA: Mono Lake (AMNH); Mariposa Co. (AMNH); Mount Diablo (AMNH); Mt. Hamilton (AMNH).

#### 2. 2. 4. 3. Stenopogon rufibarbis Bromley.

Stenopogon rufibarbis Bromley, 1931: 431.

This species is very similar to obscuriventris Loew. The male genitalia (Figs. 199-203) and the ovipositors of these two species are very slightly different from one another. These two species may be distinguished by the different color of pollen, pile, and bristles.

Distribution - This species ranges from British Columbia to Arizona, and east to Utah. Strickland (1938) included this species in his list, but the record was based on misidentified specimens of Stenopogon obscuriventris Loew. It probably does not occur in Alberta.

Number of specimens examined - 31.

Localities - BRITISH COLUMBIA: Osoyoos; Anderson Lake; Seton Lake; Oliver. WASHINGTON. OREGON: Cherry Creek, Klamath Lake; Alberta Lake.





IDAHO: Giveout (AMNH). CALIFORNIA: Keddi Plumas Co. (AMNH); Sierra Nevada (AMNH); Coleville (AMNH); Philo Mendocino (AMNH); Mt. Hamilton (AMNH); Feather River (AMNH); Butte Co. (AMNH); Cedarville (AMNH); Clio Plumas Co. (AMNH); Lassen Co.; San Antonio, Ontario; Los Angeles; Pasadena; Lake of Woods; Echo Portals, Eldorado Co. UTAH: St. George (AMNH). ARIZONA: Lacobs Lake.

2. 2. 4. 4. Stenopogon gratus Loew.

Stenopogon gratus Loew, 1872: 31.

Stenopogon univittatus Loew, 1874: 358.

This species is similar to californiae Walker, but can be distinguished by the mesonotal vestiture and the color of the pile and bristles. The bristles and pile are orange, darker than those of californiae Loew, and the mesonotum is provided with longer dorsocentral black hairs. The male genitalia are also different in the shape of the hypandrium and of the superior forceps (Figs. 204-207).

Distribution - This species is known from California only, but Strickland (1938) included it in his list.

Number of specimens examined - Two.

Localities - CALIFORNIA: San Francisco (USNM).

2. 2. 4. 5. Stenopogon inquinatus Loew.

Stenopogon inquinatus Loew, 1866: 47

Stenopogon modestus Loew, 1866: 46.

Stenopogon morosus Loew, 1874: 356.

Specimens of this species are distinguished from gratus Loew, by the reddish brown humeri. There are two forms: one with reddish brown abdomen, the other with black abdomen.



Description - Brown form: front and vertex greyish yellow pollinose; gibbosity very prominent (Fig. 13); antennae brownish or reddish black; proboscis and palpi black.

Thoracic ground color black, humeri reddish brown; pollen greyish yellow; prothorax pilose, pronotum and episternum with bristles; dorsocentral vittae brownish black; presutural dorsocentral bristles absent; metapleuron bare; scutellum reddish brown with black posterior edge.

Coxae and dorsal sides of femora black, the rest reddish brown; basal one third of claws reddish brown, the rest black.

Wings hyaline, semi-infuscated; posterior cells open; anal cell open; anterior crossvein slightly before, or at the middle of discal cell.

Abdomen reddish brown on the middle, black on lateral sides; venter black; pile long on sides of first two segments, shorter and sparser on the following segments; ventral pile long; male genitalia orange brown with black hairs; apical and of eighth segment of females with lateral pits submarginally (Fig. 91); acanthophorite orange brown, spines black.

Black form: this "form" differs only in the coloration. Trochanters black, femora black with reddish brown apices; femoral bristles black; abdomen black, eighth segment in both sexes reddish brown with apical black band; male genitalia the same as those in brown form; acanthophorites reddish brown, spines black.

In addition to those forms, there is also "intermediate form", with broad lateral sides of abdomen black and narrow middle part reddish brown.

Ecological notes - In Colorado, this species inhabits wheat grassland (James, 1938). In Alberta, it has been collected in various habitats, such as in grassland of long grass, in semi-arid prairie grassland, on gravelly river banks, in sand pits, at the edge of, or in the openings in the coniferous forests. In most cases, this species has been found associated with Asilus callidus Williston.

Distribution - This species has been recorded from British Columbia eastward





to Minnesota, and south to Arizona.

Localities - ALBERTA: Peace River (UA); Lac la Biche (UA and LMK); Opal-Coronado (UA and LMK); Celestine Lake, Jasper National Park; Jasper (CNC); Nordegg, North Saskatchewan Valley (UA); Seebe (DE); Banff (UA and CNC); Gorge Creek (UA); Redrock Canyon, Waterton Lakes Park (UA); Calgary (UA); Lethbridge (CNC); Bow River (CNC); Orion (UA); Medicine Hat (UA); Steeveville-Wardlow (UA); Consort (UA).

Other localities - BRITISH COLUMBIA: Vernon; Nicola Valley; Lillooet (CNC); Aspen Groove (CNC); Seton Lake (CNC). SASKATCHEWAN: Pike Lake (CNC). MANITOBA: Aweme (CNC). MINNESOTA: Red River of the North. IDAHO: Victor (AMNH); Givout (AMNH); Mt. Pelier (AMNH). WYOMING: Jackson (AMNH); Rawlins (AMNH); Rock Spring (AMNH). NEBRASKA: Glen, Sioux Co.; Spring View Bridge, Point Co.; West Point. COLORADO: Walsenburg (AMNH); Monte Vista (AMNH); Alamosa (AMNH); Cochetopa National Forest (AMNH). UTAH: Hatch (AMNH). ARIZONA: N. Rim Grand Canyon (AMNH); Oracle (AMNH). CALIFORNIA: Benton (AMNH); Clio Plumas Co. (AMNH).

#### 2. 2. 4. 6. Stenopogon neglectus Bromley

Stenopogon neglectus Bromley, 1931: 430.

Scleropogon neglectus Hull, 1962: 126.

Specimens of this species are readily recognized by the presence of hairs on the metapleuron. Stenopogon coyote Bromley has also hairs on the metapleuron, but these two species are readily distinguished by the difference in the wing venation.

The male genitalia are also different (Figs. 213-217). In neglectus Bromley, the superior forceps and the gonopods vary from reddish brown to black.

Ecological notes - The habitats of this species are mainly pastures, wheat grass of the grassland (James, 1938), long grass prairie, and semi-arid short grass prairie.



Distribution - This species ranges from Alberta to Arizona.

Number of specimens examined - 19.

Localities - ALBERTA: Medicine Hat (UA); Comrey, Milk River Valley (UA).

Other localities - OREGON: Castle. IDAHO: Lewiston. WYOMING: Lander; Jackson (AMNH); Carbon Co (AMNH). COLORADO: Creeds. UTAH: Ac. SL. Dsrt. NEVADA: Fallon (AMNH). ARIZONA: White Mts (AMNH).

#### 2. 2. 4. 7. Stenopogon coyote Bromley.

Stenopogon coyote Bromley, 1931: 429.

This species is similar to neglectus Bromley in having the metapleural hairs, but it is easily distinguished by the wing venation. The first posterior cell is always narrower apically, and the fourth posterior cell is always closed with long stalk (Figs. 150, 151).

Ecological notes - The habitat is similar to that of neglectus Bromley.

Distribution - This species ranges from Alberta to Arizona and New Mexico.

Number of specimens examined - 47.

Localities - ALBERTA: Drumheller (UA and CNC); Steeveville-Wardlow (UA); Dinosaur Trail, Dinosaur Provincial Park (UA); Lake Newell, Kinbrook Island Park (UA); Brooks (CNC); Medicine Hat (UA); Orion (UA); Writing-on-Stone Park (UA); Comrey, Milk River Valley (UA); Lethbridge (CNC).

Other localities - WYOMING: Lander; Lusk. SOUTHDAKOTA: Custer (USNM); Piedmont, Nowlin Co (USNM). COLORADO: Walsenburg (CNC); Salida; Poncha Spring; Colorado City. ARIZONA.





## 2. 2. 5. Genus Ospriocerus Loew.

Ospriocerus Loew, 1866: 29. Type species: Asilus abdominalis Say, 1823.

This genus is known only from the New World. It is very similar to Stenopogon Loew, but readily distinguished by the third segment of the antenna, which is provided with a pit or excavation on the apical lower side (Figs. 123, 125). There are three types of style in this genus (Martin, pers. comm.): the hidden type with a spine inside (Ospriocerus abdominalis Say); short type with apical pit and spine inside (Ospriocerus latipennis Loew); and the Mexican type. The second type of the style is like that of Neoscleropogon Malloch, as described and illustrated by Hull (1962).

Description - Most of the characters are like those of Stenopogon Loew; gibbosity not prominent (Fig. 10); metapleuron with hairs; wings broad, fourth posterior cell always closed.

In Alberta, there are two species, Ospriocerus abdominalis Say and O. consanguineus Loew, but another species, pumilus Coquillett was also included by Strickland (1938), probably on the basis of misidentified specimens; two male specimens of Stenopogon coyote Bromley were labelled as Stenopogon pumilus Coquillett by Curran and Strickland.

### 2. 2. 5. 1. Key to the species of Ospriocerus Loew of Alberta.

- First antennal segment four times as long as second; style hidden (Fig. 124)  
..... abdominalis Say
- First antennal segment at most twice as long as second; style short, with  
apical pit (Figs. 122, 123) ..... consanguineus Loew and  
pumilus Coquillett \*

\* These two species are hardly distinguishable; they are possibly conspecific.



2. 2. 5. 2. Ospriocerus abdominalis Say.

Asilus abdominalis Say, 1823: 375

Dasypogon aeacus Wiedemann, 1828: 390.

Dasypogon spatullatus Bellardi, 1861: 82.

Ospriocerus aeacides Loew, 1966: 51.

Ospriocerus abdominalis Coquillett, 1898: 37.

Ospriocerus ventralis Coquillett, 1898: 37.

Specimens of this species are easily distinguished from the other two species by the color of the abdomen and the wings. Coquillett (1898) distinguished ventralis from abdominalis Say on the basis of the color of the venter of abdomen, orange in the former and black in the latter.

Description - Head, thorax, legs, and all bristles, and pile black; antennae black, style cryptic; second segment of palpus spindle-shaped.

Wings broad, purplish, infuscated.

Abdomen mostly orange, with first and basal half of second segment black, in some females lateral margins of each segment black; eighth segment of females black, sixth and seventh segments of some females black; venter black, orange, or black and orange; male genitalia and female acanthophorites black.

Distribution - This species has been recorded from the Northwest Territories to Arizona and Texas, east to Pennsylvania.

Number of specimens examined - 24.

Localities - ALBERTA: Medicine Hat (UA); Chin, prairie coulee (UA).

Other localities - NORTHWEST TERRITORIES. BRITISH COLUMBIA: Oliver (CNC). SASKATCHEWAN: Roche Percee (CNC). NORTH DAKOTA: Beach (CNC) WYOMING: Carbon Co. (AMNH); Jackson (AMNH). UTAH: Stockton (CNC); Howel,





Dolemite (CNC); Moab, Grand Co. COLORADO: Mesa Verde (AMNH); Pagosa Spring (AMNH); Palisade (AMNH); Fort Collins; Colorado Spring; Spaniard Peak. NEBRASKA: Sioux Co. KANSAS: Golden City. OKLAHOMA: Optima (AMNH); Wichita National Forest (CNC). TEXAS: Travis Co. (AMNH); Austin (AMNH); Round Mts. NEW MEXICO: Cortez; White's City, Eddy Co. ARIZONA: CarrCanyon, Huachuca Mts., Cochise Co.; Wilcox (AMNH); Tucson (AMNH). CALIFORNIA. IDAHO: Snake Co. MONTANA: Lombard. WASHINGTON: Squaw Creek.

### 2. 2. 5. 3. Ospricerus consanguineus Loew.

Stenopogon consanguineus Loew, 1866: 48.

Stenopogon latipennis Loew, 1866: 49.

Ospricerus consanguineus, Martin, pers. comm.

Specimens of this species are easily distinguished from abdominalis Say by the size of the antennae, coloration, and wing venation.

Description - Abdominal segments greyish pollinose; pile yellowish, longer on lateral sides of first segment; male genitalia and ovipositor orange brown; gonopods of male genitalia with hair lamellae subapically (Fig. 190).

Ecological notes - James (1938) recorded this species from moist sedge meadows, arid mixed and bunch grassland, and tall weed waste land, where natural vegetation has been disturbed.

Distribution - This species ranges from Alberta to Manitoba, and south to Texas.

Number of specimens examined - 16.

Localities - ALBERTA: Medicine Hat (UA).

Other localities - MANITOBA: Onah (CNC). SOUTH DAKOTA: Sioux Co. WYOMING: Douglas (AMNH). NEBRASKA: Pierre; Chandron; Agate (CNC). COLORADO: Boulder (AMNH); La Junta (AMNH); Regnier; Wray; Rocky Ford; Roggen; Denver.



NEW MEXICO: San Jon (AMNH). OKLAHOMA: Greer Co.; Chickasha. TEXAS: Dallas.

#### 2. 2. 5. 4. Osprionotus pumilus Coquillett.

Stenopogon pumilus Coquillett, 1904: 33.

Scleropogon pumilus Hull, 1962: 126.

Osprionotus pumilus Martin (pers. comm.)

This species is strikingly similar to consanguineus Loew and may be conspecific. The male genitalia of the two are not different.

Distribution - This species is known from Texas and Kansas. Strickland (1938) included it in his list, but this was probably based on misidentified specimens.

Number of specimens examined - Five.

Localities - KANSAS: Clarke Co.; Ellis Co. (USNM) TEXAS: Brownsville (USNM); Spur (USNM); Hidalgo Co. (USNM).

#### 2. 2. 6. Genus Holopogon Loew.

Holopogon Loew, 1847: 473. Type species: Dasypogon nigripennis Meigen, 1820.

Podoctria Megerle (Ms) in Meigen, 1820: 279. Nomen Nudum.

Ceraturgus Rondani, not Wiedemann, 1856: 156.

The species of this genus are small, 4.5 - 9.0 mm., mostly black with long "curly" pile. In the United States and Canada, 17 species have been described (Martin, 1959). They are grouped into two subgenera: three in Dasyholopogon Martin, and the rest in the subgenus Holopogon Loew.

The species of the subgenus Holopogon Loew are very similar to one another; the male genitalia are non-diagnostic, and most of the remaining characters are relative and variable. Because of this, Martin grouped the species into four species





complexes: seniculus complex, acropennis complex, phaeonotus-oriens complex, and guttula complex. Further, he stated that the taxonomic status of these complexes is not certain. They may be indeed more than one species, two or more subspecies, or each may be a single highly variable species.

Description - Head broad and short (Figs. 16, 17); face broad and flat; front slightly narrower at antennal base, with depression in front of ocellar plate, the latter elevated, more or less rounded; front with lateral protuberance; antennae black, first two segments equal, third elongate, tapering apically, style with two microsegments (Fig. 127), the first very small; palpi two segmented; face, front, and vertex pilose and pollinose.

Thoracic ground color black; pleura white pollinose; presutural mesonotum, except dorsocentral vittae and posterior inner quarter, white pollinose, the rest of mesonotum and scutellum black; pile on prothorax, mesopleuron, anterior and posterior corners of sternopleuron, metapleuron, and mesonotum and scutellum, long, sometimes shorter on mesonotum; lower slope of metanotum golden yellow tomentose; bristles weak, hardly distinguishable from pile.

Legs black; coxae greyish pollinose, with long pile on anterior sides of front, and lateral sides of middle- and hind pairs; femora stout, with pile; hind tibiae club-shaped, ventral sides of front- and hind tibiae golden yellow tomentose; ventral sides of tarsi golden yellow tomentose, hind basitarsi swollen; claws curved, empodium short.

Wings hyaline, alula small; venation varies slightly within the species; fifth vein slightly curved anteriorad; branching of third vein at or slightly beyond the tip of discal cell; marginal, submarginal, and posterior cells open; anal cell closed, with or without stalk, in some others open (Hull, 1962).

Abdomen pilose laterally, more or less shining dorsally; venter pilose; bristles absent, or undetectable; male genitalia short, reddish, partly rotated (90°); gonopods with arms and spine-like processes (Fig. 220); clasper also spine-like; ovipositor reddish,



acanthophorites with four to five pairs of spines.

The coloration of the pile shows sexual dimorphism.

Three species are present in Alberta: albipilosa Curran, seniculus Loew, and nigripilosa new species. All three species belong to the subgenus Holopogon Loew.

#### 2. 2. 6. 1. Key to the species of Holopogon Loew of Alberta.

- 1. Wing veins yellow ..... seniculus Loew
- Wing veins brown ..... 2
- 2. Pile on mesonotum and scutellum white ..... albipilosa Curran
- Pile on posterior mesonotum and acutellum black ..... nigripilosa n. sp.

#### 2. 2. 6. 2. Holopogon albipilosa Curran

Holopogon albipilosus Curran, 1923: 207.

This species shows sexual dimorphism in the coloration of the pile. The pile on the front and the vertex black in the males, white in the females; the mystax is black with few white hairs in the males, white with one or two black hairs in the females; the antennal hairs are black in the males, white in the females; the rest of the pile is brownish in the males and white in the females.

Distribution - This species ranges from British Columbia to Manitoba, south to Nevada and Wyoming.

Number of specimens examined - Holotype, allotype, and additional 19 specimens.

Localities - ALBERTA: Wainwright (UA); Drumheller (UA); Medicine Hat (UA and CNC); Orion (UA); Lethbridge (CNC); Oldman River, Lethbridge (CNC); Picture Butte (UA).

Other localities - BRITISH COLUMBIA: Vernon (type locality; CNC); Chilcotin (CNC). SASKATCHEWAN: Saskatoon (CNC); Saskatchewan Landing (CNC). MANITOBA.





IDAHO: Montpelier (AMNH). WYOMING: Carbon Co. (AMNH); Green River (AMNH); Jackson (AMNH); near Lander (AMNH). NEVADA.

2. 2. 6. 3. Holopogon seniculus Loew.

Holopogon seniculus Loew, 1862: 62.

This species is readily distinguished from the others by the yellow wing veins. The pile is long, white in the males and yellowish in the females.

Distribution - This species is known from Alberta and Saskatchewan, south to Colorado, and west to Nevada.

Number of specimens examined - 10.

Localities - ALBERTA: Scandia (CNC); Medicine Hat (CNC); Lethbridge (CNC).

Other localities - SASKATCHEWAN: Saskatoon (CNC). WYOMING. NEBRASKA: Chandron (WSU). COLORADO: Lamar (AMNH). NEVADA.

2. 2. 6. 4. Holopogon nigripilosa new species.

This species is easily distinguished from albipilosa Curran and seniculus Loew by the color of the mystax, which is black in females, and the black pile on the posterior mesonotum and on the scutellum. It is described from three female specimens. Length: 8.0 mm.

Description - Female: Face, front and vertex, pale golden yellowish pollinose; pile on vertex, front, and ocellar triangle golden yellow, mixed with black on frontal protuberance; mystax black, pale golden yellowish pile present along lateral margins of face; antennae black, with black hairs on first two segments; occiput black, lower half golden yellowish pollinose, bristles and hairs on upper part black; pile on lower half of occiput, on proboscis and palpi, and beard, white.

Prothorax yellowish white pollinose and pilose, middle pronotum brownish



tomentose; dorsocentral vittae brown; humeri, anterior lateral margins of mesonotum, white pollinose, the rest of mesonotum brownish tomentose; white pile present on anterior one fourth of mesonotum, anterior lateral margins, to sutures, the rest of mesonotal pile black; scutellum brownish tomentose, black pilose; mesopleuron brownish pollinose, paler on anterior half, white pilose; metanotum brownish pollinose.

Coxae greyish brown pollinose, white pilose; femora, and front and middle tibiae white pilose, hind tibiae with black hairs; bristles on tibiae and tarsi black; claws reddish brown half basally, black apically.

Wings hyaline, microtrichiae brownish, veins brown; venation of average Holopogon Loew (Fig. 152), anal cell closed with stalk.

Abdomen shining black with lateral sides of first two segments yellowish brown pollinose; pile white, longer on sides of first two segments, shorter on succeeding segments, very short and sparse on dorsum; ventral pile long, white; acanthophorites black, with four black spines.

This species is called nigripilosus, because of the black mesonotal and scutellar pile, which is used for distinguishing this species from the other two species from Alberta.

Ecological notes - This species was collected from a glade in a coniferous forest, with short grass and herbs.

Holotype: female, Opal-Coronado, Alberta, 5.VII.1963 (L. Kenakin and S. Adisoemarto); deposited in CNC.

Paratypes: same data; deposited in UA.

## 2. 2. 7. Genus Heteropogon Loew

Heteropogon Loew, 1847: 488. Type species: Dasypogon manicatus Meigen, 1820.

Anisopogon Loew, 1874: 377.

The name Anisopogon Loew was used as a substitute for Heteropogon Loew, the latter name having been used for a plant (Back, 1909). However, Anisopogon Loew was





used by Hull (1962) for the second subgenus of Heteropogon Loew.

Description - Head wide and flat or short; face and occiput pilose; pile similar to "plume"; first two antennal segments equal, third segment tapering apically, one and half times as long as first two segments together (Fig. 150); style two-segmented, the first segment small.

Thorax with more or less rounded mesonotum; anterior mesonotum and mesopleuron pilose; humerals, presuturals, intraalars, dorsocentrals, postalars, and scutellars present.

Legs slender; coxae pilose; bristles present on anterior sides of femora, several rows on tibiae, subapically on tarsi; basitarsi long, at least twice as long as second segment; ventral sides of tarsi setulate.

Wings hyaline, partly smokey or diffusedly maculate (Fig. 153); venation normal, all posterior cells open, anal cell open very narrowly apically or closed, alula present.

Basal abdomen as broad as thorax, tapering apically to one third basal width; male genitalia shiny dorsally, more or less pointing downward (Figs. 222-225).

Coquillett (1893a) and Wilcox (1941) gave synopses of the species of Heteropogon Loew of North America north of Mexico. A single species, Heteropogon wilcoxi James, is known from Alberta.

#### 2. 2. 7. 1. Heteropogon wilcoxi James.

Heteropogon wilcoxi James, 1934: 84

Description - Mystax, frontal and vertical pile, and beard, white; four ocellars white; antennae black, one bristle on apical lower side of second antennal segment white; occiput black, white pilose, bristles white; palpi two-segmented, subequal, first segment excavated laterally (Fig. 45).

Thorax greyish yellow pollinose; prothoracic pile long; mesonotal pile present marginally, dorsocentrally and acrostchally; long pile also present on anterior and



posterior corners of sternopleuron, on mesopleuron, on metapleuron, and on upper center of hypopleuron.

Coxae and femora black, tibiae and tarsi yellow to orange brown; coxae yellowish pollinose with long white pile; femora with pile on ventral sides, bristles on basal ventral and apical posterior sides of front-, and anterior sides and apices of middle- and hind pairs; ventral sides of front- and hind tibiae, and tarsi, golden yellow tomentose; claws strong, curved, black; empodium short, brown.

Wings slightly longer than abdomen, veins brown; anal cell open narrowly; branching of third vein above tip of discal cell; anterior crossvein behind the middle of discal cell (Fig. 153).

Abdomen yellowish grey pollinose; white pile present on lateral margins, shorter on posterior segments; dorsum covered with short, sparse pile; ventre white pilose; last three segments of female shining black, acanthophorites black, bearing five pairs of black spines; male genitalia shining brownish orange (Figs. 222-225).

Distribution - This species ranges from Alberta to Arizona.

Number of specimens examined - Seven.

Localities - ALBERTA: Lethbridge (UA and CNC).

Other localities - WYOMING. COLORADO: Model, Hochne; Mesa de Maya, Tobe; Springer. ARIZONA: Holbrook. ILLINOIS: Joliet.

## 2. 2. 8. Genus Lestomyia Williston.

Lestomyia Williston, 1883: 19. Type species: Clavator sabulorum Osten-Sacken, 1877. Clavator Osten-Sacken not Philippi, 1877: 391.

In appearance, these flies resemble Lasiopogon Loew, but are distinct in antennae and some other characters, such as the vertex, the front, the gibbosity, and the presence of a bent tibial spur on front tibiae. Male genitalia are rotated about 90°;





hypandrium subtriangular; aedeagus long; superior forceps more or less like those of Heteropogon Loew (Fig. 58).

Description - Face broad, gibbosity not too prominent; front and vertex convex marginally, ocellar plate elevated, rounded; antennal first two segments subequal, third swollen apically, style single segmented, truncate, hollow on tip (Fig. 128); palpi two-segmented.

Thorax with strong bristles, markedly pollinose, less pilose.

Legs slender; pile short, appressed; bristles stout, mostly on tibiae and tarsi; claws long; empodium two thirds as long as claws, sharp.

Wings hyaline, all posterior cells open, anal cell open narrowly; branching of third vein above or beyond tip of discal cell; anterior crossvein slightly beyond middle of discal cell; alula well developed (Fig. 154).

Abdomen elongate, pile short and semi-appressed, longer on first segment; bristles present on sides of first segment.

Seven species are included in this genus, all Nearctic in distribution. In Alberta this genus is represented by one species, Lestomyia sabulonum Osten-Sacken.

#### 2. 2. 8. 1. Lestomyia sabulonum Osten-Sacken.

Clavator sabulonum Osten-Sacken, 1877: 392.

Lestomyia sabulonum Williston, 1884: 20.

Specimens of this species is yellowish grey pollinose; all bristles are white. Size 7.0 - 11.0 mm. in males, 8.0 - 12.0 mm. in females. There is no sexual dimorphism in this species.

Variation - The number of bristles varies individually; the ocellar bristles three to four pairs; metapleural bristles in a row of four to six; humerals three to four; post-humerals none to two; intraalars two to three; dorsocentrals eight to ten; scutellars three to four pairs.



Ecological notes - Specimens of this species live in mainly dry or arid fields, with short grass and cacti, near to, or far from, water.

Distribution - This species is known from British Columbia and Alberta, south to California, east to Wyoming.

Number of specimens examined - 35.

Localities - ALBERTA: Burdett (UA); Medicine Hat (UA); Comrey, Milk River Valley (UA); Writing-on-Stone Provincial Park (UA); Little Bow Park, McGregor Lake (UA).

Other localities - BRITISH COLUMBIA: Oliver (CNC). CALIFORNIA: Claremont (CNC). WYOMING: Rawlins (AMNH).

## 2. 2. 9. Genus Nicocles Jaennicke.

Nicocles Jaennicke, 1867: 355. Type species: Nicocles analis Jaennicke, 1867.

Pygostolus Loew, 1866: not Haliday, 1833, Type species: Dasypogon politus Say, 1823.

This group includes flies with rather flat abdomens. The head is similar to Heteropogon Loew and Lestomyia Williston, but the shapes of the antennae (Fig. 129) and the mystax (Figs. 20-22) readily distinguish the two groups. The humeral bristles are absent from Nicocles Jaennicke.

Description - Face flat, bristles present along epistomal margin; first two antennal segments subequal, third segment tapering apically, bristles present on lower side of second segment; vertex and front broad, semiparallel (Fig. 22); proboscis short; palpi two-segmented, subequal (Fig. 44).

Thorax with bristles on posterior half of mesonotum; humerals absent; presuturals present; metapleuron with bristle-like hairs.

Legs slender; bristles present on middle, femora, on tibiae, and on tarsi; front and hind basitarsi twice as long as second tarsal segments (Figs. 75, 76).





Wings longer than abdomen, maculate in some species; discal cell elongate; third vein branch above or beyond tip of discal cell; anterior crossvein at apical two-third of discal cell; all posterior cell open, anal cell narrowly open at tip or closed; alula not well developed.

Abdomen shiny and rather flat (Figs. 94-96). In males: seventh segment concealed under broader sixth segment; male genitalia small, not rotated, concealed under sixth abdominal segment. In females: eighth segment concealed inside seventh segment; acanthophorites with five pairs of spines.

This genus is represented in the Neotropical Region by one species, and in the Nearctic Region by 14 species. One species, Nicocles utahensis Banks, occurs in Alberta.

#### 2. 2. 9. 1. Nicocles utahensis Banks.

Nicocles utahensis Banks, 1920: 66-67.

Nicocles punctipennis Melander, 1923c: 217-219.

This species is easily recognized by the shiny black abdomen and incomplete silvery white marking on the fifth segment of males and females. The silvery markings differ between the sexes. In the males, the marking on the fifth abdominal segment incomplete, interrupted medially, broader laterally, and on the sixth segment, the marking is entire (Fig. 94). In the females, the markings are present on the last three segments, broad on the lateral margins, tapering, and separated by small gap, medially (Fig. 96).

Distribution - This species ranges from British Columbia and Alberta, south to Oregon and Utah.

Localities - ALBERTA: Medicine Hat (CNC).

Other localities - BRITISH COLUMBIA: Robson (CNC).



2. 2. 10. Genus Cyrtopogon Loew.

Cyrtopogon Loew, 1847: 516. Type species: Asilus ruficornis F., 1794.

Euarmostus Walker, 1851: 102. Type species: Euarmostus bimacula Walker, 1851.

Eupalamus Jaennicke, 1867: 86. Type species: Eupalamus alpestris Jaennicke, 1867.

Preoccupied in Hymenoptera, Wesmael, 1844, and in Coleoptera, Schmidt-Goebel, 1846.

Palamopogon Bezzi, 1927: 61. Type species: Palamopogon alpestris Jaennicke, 1867.

Philammosius Rondani, 1856: 156. Type species: Dasypogon fimbriatus Meigen, 1820.

Wilcox and Martin (1936) included 68 species in this genus. The species were arranged in 21 groups and five "single" species: falto Walker, laphriformis Curran, lyratus Osten Sacken, alleni Back, and tenuis Bromley.

This genus seems to be the most successful group in North America north of Mexico; so far it has not been reported from Mexico (Wilcox and Martin, 1936). Twenty three species have been reported from the Palearctic, two from the Ethiopian, and three from the Oriental Region (Hull, 1962). There are 14 species known from Alberta.

There are many characters for the identification of the species, depending on the group, such as shape, color, and ornamentation of the tarsi; ornamentation of the abdomen; markings on the wings; shape of the mystax; the scutellum; the metapleura; the legs; the claws; the gibbosity and width of the face; and the antennae (Wilcox and Martin, 1936).

Back (1909) noticed that some species were aberrant forms of the genus, which were placed in different genera: Eucyrtopogon by Curran (1923), Metapogon by Coquillett (1904); Nannocyrtopogon by Wilcox and Martin (1936).

Most species live in areas near or within coniferous forests. Other known habitats are: sand near willows along running waters, and open desert. Limited data on the phenology and mating behaviour of some of the species were presented by Wilcox and Martin (1936). Melin (1923) provided information on the biology of the Palearctic species,





Cyrtopogon lateralis Fallen.

See Wilcox and Martin (1936) for the description of the genus.

2. 2. 10. 1. Key to the species of Cyrtopogon Loew of Alberta.

1. Last segment of front tarsus elongate, as long as three preceeding segments together, flattened (Fig. 81 ); first abdominal segment with a posterior pollinose fascia ..... lineotarsus Curran
- Fore tarsus with subequal segments; first abdominal segment without a posterior pollinose fascia ..... 2
2. Hind tibiae entirely black ..... 3
- Hind tibiae entirely or partly reddish or orange brown ..... 6
3. Mystax entirely black; tibial pile short ..... 4
- Mystax with white or yellow pile; tibial pile long, black or mixed with white ..... 5
4. Tibial pile in both sexes black; hairs of male genitalia black ... nugator Osten Sacken
- Tibial pile white; hairs of male genitalia white ..... sansoni Curran
5. Silvery hairs on segments 1 to 5 of male front tarsus, not noticeably longer apically; first two abdominal segments with yellow hairs; hind femora yellowish haired ..... praepes Williston
- Silvery hairs on segments 2 to 5 of male front tarsus, longer apically; more than two basal abdominal segments with pale yellow hairs; hind femora with black hairs ..... willistoni Curran
6. Abdomen with dense, erect, light colored pile, covering at least the dorsum of abdominal segments 2 and 3 ..... dasyllis Williston
- Pile of abdomen not as above ..... 7
7. Hind tibia with long white pile ..... montanus Loew
- Hind tibia without such long pile ..... 8



8. Metapleural bristles entirely black ..... 9
  - Metapleural bristles mixed with orange, or entirely orange or pale yellow  
..... 10
9. Third antennal segment orange; tarsal segments mostly black .....
  - ..... aurifex Osten Sacken
  - Third antennal segment black; last tarsal segment black, the remaining reddish  
brown ..... bimacula Walker
10. Scutellum silvery pollinose; hind tibia black; metapleural bristles entirely  
orange or pale yellow ..... nugator Osten Sacken
  - Scutellum not or hardly pollinose; hind tibia partly or entirely orange, reddish,  
or yellow; metapleural bristles mixed orange and black ..... 11
11. Antennae entirely black ..... 12
  - Third antennal segment orange ..... 14
12. Basal one third of hind tibia black, the remaining orange or reddish brown. 13
  - At least basal half of hind tibia orange, tibial apex black ..... 14
13. Anterior tibia black; tibial pile long ..... inversus Curran
  - Anterior tibia orange brown; tibial pile practically absent .... albovarians Curran
14. Abdominal bands interrupted medially ..... distinctitarsus n. sp.
  - Abdominal bands complete, orange ..... 15
15. Male ..... 16
  - Female ..... 17
16. Front tibia and tarsus with white fringe of hairs, as long as diameter of  
segments; pile on face orange; 2 - 4 abdominal segments with orange pile  
across the segments ..... auratus Cole
  - Front tibia and tarsus without fringe of hairs; bristles or hairs on face black  
mixed with white or yellow; pile of abdomen only on lateral sides, absent  
from fourth segment ..... glarealis Melander





17. Pile on third abdominal segment as long as that on second .....

..... auratus Cole

-- Pile on third abdominal segment shorter than that on second .....

..... glarealis Melander

## 2. 2. 10. 2. Cyrtopogon auratus Cole.

Cyrtopogon auratus Cole, 1919: 230.

Cyrtopogon albitarsis Curran, 1922: 278-279.

Cyrtopogon albitarsis Curran, 1924: 279.

This species belongs to the aurifex group, in which the male abdominal segments 2-4 are provided with dense fulvous pile across the segments.

Description - Males: face with mane-like orange pile; front tibia and front tarsus with fringe of white hairs on outer sides (Fig. 78); fifth to seventh abdominal segments short, tectiform; male genitalia black, form as in figures 226-229.

Females: mane on gibbosity sparser; fringe of white hairs absent from front tibia and front tarsus; abdominal segments not tectiform, yellow pile on first three segments shorter than that of male, still shorter on fourth, and almost absent from fifth.

A female specimen from Yellowstone Park, Cascades Y. R., 22. Vii. 1923 (A. L. Melander), was chosen as allotype of albitarsis Curran, 1922, but determined by G. Stuart Walley, 1932, as not the allotype.

Distribution - This species ranges from Alberta to Oregon, southeast to Colorado.

Number of specimens examined - Holotype and 14 additional specimens.

Localities - ALBERTA: Banff (type locality; CNC); Banff, Lake Minnewanka, Devil's Gap Trail (UA); Waterton (AMNH); Gorge Creek (UA).

Other localities - WASHINGTON: Mt. Spokane. OREGON: Strawberry Mtn., Grant Co. (CNC); Wallowa Lake. IDAHO: Long Valley, Alpha (UA). WYOMING: Yellowstone National Park, Madison Junction (AMNH); Yellowstone N.P., Cascades



Y. R. (CNC); Sylvan Pass, Yellowstone Park. COLORADO: Malta (AMNH). UTAH: Uintah Mts.

2. 2. 10. 3. Cyrtopogon aurifex Osten Sacken.

Cyrtopogon aurifex Osten Sacken, 1877: 301-302.

This species is similar to auratus Cole, but the two are distinguished by the color of the metapleural bristles: entirely black in aurifex Osten Sacken, mixed with orange in auratus Cole.

Distribution - This species ranges from Alberta and British Columbia, south to California.

Number of specimens examined - Two.

Localities - ALBERTA: Seebe, Kananaskis Forest (DE).

Other localities - BRITISH COLUMBIA: Vancouver Island. WASHINGTON: Mt. Adams, Clearwater; Mt. Adams, Signal Peak. OREGON: Mary's Peak; Crater Lake. CALIFORNIA: Weber Lake, Sierra Nevada; Gold Lake, Sierra Co.

2. 2. 10. 4. Cyrtopogon willistoni Curran.

Cyrtopogon willistoni Curran, 1922: 277-278.

This species belongs to the callipedilus group, in which the last two segments of the middle tarsus of the males are provided with a disc of black hairs (Fig. 80). The males of this group are more or less easily separated from one another by the shape of the silvery hairs on the front tarsi, but the females are hardly distinguishable.

Distribution - This species ranges from Alberta and British Columbia, south to California and Colorado.

Number of specimens examined - 32.

Localities - ALBERTA: Banff (UA and CNC); Calgary (UA and DE); Mountain View (CNC); Twin Butte (CNC); Waterton Lakes Park (CNC and UA).





Other localities - BRITISH COLUMBIA: Chilcotin (AMNH); Aspen Grove (AMNH). Minnie Lake; Nicola, Oliver. WASHINGTON: Signal Peak (AMNH); Blue Mts., Godman Springs; Colville; Mt. Adams; Mt. Spokane; Tampico; Yakima. OREGON: Fish Lake; Steins Mts., Harney Co.; Ontario; Strawberry Mt., Grant Co. IDAHO: Long Valley, Alpha. MONTANA: Gallatin Co.; Madison Co.; Bozeman. WYOMING: Mammoth Hot Springs, Yellowstone National Park (AMNH); Grand Teton Nat'l Park; COLORADO: Elbert (AMNH); Electra Lake (AMNH); Ouray (AMNH); South Fork (AMNH). UTAH: Roosevelt Creek, Raft River Mts.; Zion Nat'l Park. CALIFORNIA: Coleville, Mono Co. (AMNH); Sacramento.

2. 2. 10. 5. Cyrtopogon praepes Williston.

Cyrtopogon praepes Williston, 1884: 12.

This species is similar to willistoni Curran. The males are distinguished by the presence of the silvery hairs on the first tarsal segment of the front tarsus, and the females are distinguished by the yellowish hairs on the hind femora.

Distribution - Strickland (1938) included this species in his list, but I do not believe it occurs in Alberta. This species ranges from British Columbia to California and Nevada.

Number of specimens examined - Four.

Localities - BRITISH COLUMBIA: Vaseaux (CNC); Penticton (CNC); Robson (USNM). WASHINGTON: Olympia; Roy. OREGON. IDAHO. NEVADA: Elko (USNM). CALIFORNIA: San Fransisco; Santa Cruz; Santa Rosa.

2. 2. 10. 6. Cyrtopogon bimacula Walker.

Euarmostus bimacula Walker, 1851: 102.

Cyrtopogon melanopleurus Loew, 1866: 61.

Cyrtopogon bimacula Loew, 1874: 365.



This species is easily recognized by the wings of the males: maculated at the apex and the tip of the anal cell (Fig. 155); in the females, there is slight tendency of light infuscation on the wings of the same pattern as in the males; both sexes have largely yellowish white pile, and black metapleural bristles.

Distribution - This species is transcontinental in the North, ranging from the Northwest Territories to New Mexico.

Number of specimens examined - 71.

Localities - ALBERTA: High Level (UA); Flatbush, Pembina River (UA); Lac la Biche, Owl River (UA); Chipewyan (CNC); Opal (UA); Sandy Lake (UA); Beaverlodge (UA); Nordegg; Columbia Icefield (UA); Calgary (UA); Wilkinson Creek, Bow River Forest (UA); Lethbridge (UA); Morrin (CNC); Medicine Hat (CNC); Elkwater (CNC); Cypress Hills (UA).

Other localities - NORTHWEST TERRITORIES: McKenzie Delta, Reindeer Depot (CNC). BRITISH COLUMBIA: Steelhead; Lorna. WASHINGTON: Mt. Rainier, Sunrise, Paradise; Mt. Baker. OREGON: Aneroid Lake Blue Mts.; Horse Mt., Lane Co.; Frog Meadows, Lane Co. IDAHO. MONTANA: Skalkadho Pass, Ravalli Co. WYOMING: Yellowstone Nat'l Park. COLORADO: Camp Creek R. Station; Aspen; South Peak; Ward. NEW MEXICO: Las Vegas Mts. SASKATCHEWAN: Dandrum (CNC); Saskatoon (CNC); St. Victor (CNC). MANITOBA: Douglas (CNC). ONTARIO: Sand Lake (CNC); Sadbury. QUEBEC: Megantis (CNC); Seven Isles (CNC). NOVA SCOTIA: Truro. NEW HAMPSHIRE: Breton Woods; Mt. Washington; White Mountains.

#### 2. 2. 10. 7. Cyrtopogon distinctitarsus new species.

This species resembles bimacula Walker to some extent, but is distinguished by the color pattern of the legs and the color of the metapleural bristles.

Description - Female: Face, front, and vertex, golden yellow pollinose; mystax black, mixed with golden yellow pile on center of gibbosity; hairs on front,





vertex, occiput, first two antennal segments, and second palpal segment, black; beard, pile on first palpal segment and on lower side of proboscis, white; antennae black; gibbosity prominent near antennal base (Fig. 18).

Thorax golden yellow pollinose; pleura without shiny bare area; pollinose color pattern similar to bimacula Walker; pile on propleuron white, on pronotum, metanotum, and scutellum, black; metapleural hairs orange yellow.

Legs bicolored; basal halves of tibiae, basal three-fourths of basitarsi, basal halves of tarsal segments 2 - 3, orange brown; the remainder of legs black; basal half of claws orange, apex black; empodium very short, orange; pulvilli broad; pile on coxae yellowish, on lower sides of femora white, on upper sides black, short, appressed, longer on apices of hind pair, on tibiae, black, short, sparse; bristles of tibiae and tarsi black.

Wings hyaline, with microtrichiae, brownish maculate on the following: anterior crossvein, base of discal cell, anterior branch of cubitus and mediocubital crossvein, apex of discal cell and branching of third vein (Fig. 156); anterior crossvein at basal one fourth of discal cell; halteres orange.

Abdomen black, more or less similar to bimacula Walker; pile yellowish; spines reddish brown.

This species has been named distinctitarsus, because the color pattern of the tarsi is quite distinct from the remaining species of Cyrtopogon from Alberta.

Holotype: Female, Opal, Alberta, 5.VII.1963 (L. Kenakin and S. Adisoemarto); deposited in CNC.

Paratypes: Female, Lac la Biche, sand dunes, N. E. shore, Alberta, 2-4.VII.1964 (L. M. Kenakin and S. Adisoemarto); female, Lethbridge, Alberta, 24.VI.1960 (D. Larson); deposited in UA.

## 2. 2. 10. 8. Cyrtopogon montanus Loew.

Cyrtopogon montanus Loew, 1874: 362.

This species is easily recognized by the color of the mystax, and the long pile



on the abdominal segments and the legs, mostly black in the males and white in the females.

Description - Upper middle part of mystax white, the remaining black; frontal, vertical, and upper occipital pile black; beard white; antennae black, third segment slightly orange, pile on first two segments white.

Propleural pile white, pile on the remainder of thorax black.

Legs mostly black, hind tibiae and hind tarsi reddish brown; pile on coxae, lower basal femora, and dorsal sides of hind tibiae, white, the remaining pile of legs black.

Abdominal pile of male bicolored, on posterior corners of each segment white, the remaining black; male genitalia (Figs. 230-233) black, with black hairs; abdominal pile of females entirely white.

Distribution - This species is found in central western North America, from British Columbia, south to California, and east to New Mexico.

Number of specimens examined - Holotype (CNC) and eight additional specimens.

Localities - ALBERTA: Banff (type locality; CNC).

Other localities - BRITISH COLUMBIA: Seton Lake (UA); Vernon; Departure Bay; Gold Stream; Lillooet; Oliver. WASHINGTON: Cle Elum; Mt. Adams, Signal Peak, West Klickitat; Mt. Rainier, Sunrise, White River; Olympia; White Rock Spring, Steven Pass, Cascade Mountains. OREGON: Anthony Lake; Canby; Fox; Hood River; Marys Peak; McKenzie Pass; Mt. Hood; La Grande; North Powder. IDAHO: Lake Waha; Long Valley, Alpha; Mosco Mt.; Potlach. UTAH: Ogden. CALIFORNIA: Towle (AMNH); Emigrant Gap (AMNH); Gold Lake (AMNH); Sierra Nevada; Fallen Leaf Lake; Lake Tahoe; San Bernardino Mts.; Mt. St. Alens; Sequoia Nat'l Park, Waverton; Truckee; Yosemite Valley. COLORADO: Boulder; Gold Hill; Longs Peak Inn; Ward; Poncha Pass. NEW MEXICO.





2. 2. 10. 9. Cyrtopogon albovarians Curran.

Cyrtopogon albitarsis Curran, 1923: 134-135, not Curran, 1922: 278-279.

Cyrtopogon albovarians Curran, 1924: 279-280.

The first specimen was first described as the allotype of albitarsis Curran, 1922 (= auratus Cole), but then Curran (1924) realized that the specimen belong to a different species, and described it as albovarians.

It differs from auratus Cole (= albitarsis Curran) in the following characters: Antennae entirely black; upper one third of mystax white, the remaining black; pile on posterior mesonotum white; pile on mesopleuron longer, white on lower side, black on upper side; metapleural pile white; metanotal pile black; pile on sides of third and fourth abdominal segments mixed with black.

Distribution - This species is known only from Alberta.

Number of specimens examined - Holotype (CNC) and one additional specimen.

Localities - ALBERTA: Banff (type locality; CNC); Wabamun (UA).

2. 2. 10. 10. Cyrtopogon inversus Curran.

Cyrtopogon inversus Curran, 1923: 172-173.

This species is similar to albovarians Curran, but can be distinguished by the black anterior tibiae and the long tibial pile.

Distribution - This species ranges from Alberta and British Columbia, south to Oregon, and east to Colorado.

Number of specimens examined - Two.

Localities - ALBERTA: Seebe, Kananaskis Forest (DE).

Other localities - BRITISH COLUMBIA: Aspen Grove; Darcy; Nicola; Chilcotin; Hadley; Kamloops; Lillooet, Seton Lake. WASHINGTON: Signal Peak, Ranger Station; Virden. OREGON: Eagle Ridge, Klamath Lake. WYOMING: Yellowstone



Nat'l Park. COLORADO: Longs Peak.

2. 2. 10. 11. Cyrtopogon glarealis Melander.

Cyrtopogon glarealis Melander, 1923a: 113-114.

This species belongs to the pulcher group, but is distinguished from pulcher Back by the color of the pile on the second abdominal segment of the males (black in glarealis Melander, orange in pulcher Back), and by the color of the metapleural hairs in the females (largely black in the former, orange in the latter).

Males of this group are easily recognized by the form of the abdominal segments, which are gradually compressed laterally toward the posterior end, and by the orange third antennal segment.

Distribution - This species ranges from Alberta and British Columbia, south to California and Wyoming.

Number of specimens examined - Three.

Localities - ALBERTA: Kootenay Plains, 116° 25'W 52° 7'N. (LMK)

Other localities - BRITISH COLUMBIA: Salmon Lake, Nicola District.

WASHINGTON: Spokane; Wolf Fork, Touchet River, Blue Mts. OREGON: Wallowa Lake, Aneroid Lake Trail. IDAHO: Gold Hill, Latan Co.; Moscow Mts.; Long Valley, Alpha (UA). MONTANA: Big Hole Battle Field, Beaverhead Co.; Gallatin Co. WYOMING: Madison Junction, Yellowstone Nat'l Park; Dunroven Pass. CALIFORNIA: Angora Peak, Tahoe.

2. 2. 10. 12. Cyrtopogon lineotarsus Curran.

Cyrtopogon lineotarsus Curran, 1923: 187-188.

This species is a member of the leptotarsus group, in which the last tarsal segment of the front tarsus is elongate (Fig. 81). In the males, the gibbosity is almost





triangular from the anterior aspect; it reaches the antennal base and is very prominent.

A female specimen from Glacier Park, Montana, 5.VIII.1925 (G. A. Mail) was doubtfully identified by Wilcox (1935) as Cyrtopogon lineotarsus Curran, and also described as the female of lineotarsus Curran by Wilcox and Martin (1936), although they were doubtful of the possibility, because this specimen differed in the color of the mystax from the type specimen; the mystax is entirely white in the female, and some other differences are also obvious: the thoracic, abdominal, coxal, and femoral pile, is entirely white.

According to Wilcox and Martin (1936), lineotarsus Curran could be the same species as predator Curran, based on comparison of the specimens of both sexes with the types of both species.

Distribution - This species ranges from Alberta to Montana.

Number of specimens examined - Holotype (CNC) and two additional specimens.

Localities - ALBERTA: Banff (type locality; CNC); Kananaskis Valley, Pocaterra Creek (CAS).

Other locality - MONTANA: Glacier Park.

## 2. 2. 10. 13. Cyrtopogon sansoni Curran.

Cyrtopogon sansoni Curran, 1923: 138-139.

This species belongs to the nugator group, in which the scutellum is flat, largely pollinose on the center, shining on the edge. The hyoplural hairs are entirely white, and the abdominal bands are interrupted medially.

Description - Face broader than long; gibbosity golden brownish pollinose, more or less rounded; front, vertex, and occiput greyish pollinose, black pilose; mystax black; beard white.

Mesonotal pile and scutellar hairs brownish black; mesonotal bristles black.



Distribution - This species is known from Alberta only.

Number of specimens examined - Holotype (CNC) and allotype (CNC).

Localities - ALBERTA: Banff (type locality; CNC).

2. 2. 10. 14. Cyrtopogon nugator Osten Sacken.

Cyrtopogon nugator Osten Sacken, 1887: 307.

This species is strikingly similar to sansoni Curran and hardly distinguished from it. See Wilcox and Martin (1936) for the diagnostic characters.

Distribution - This species ranges from British Columbia, south to Arizona and New Mexico. Strickland (1938) included this species in his list, but I do not believe it occurs in Alberta.

Number of specimens examined - Six.

Localities - BRITISH COLUMBIA: Saanich; Vernon; Agassiz. WASHINGTON: Signal Peak; Rainier Nat'l Forest; Sumner (UA). OREGON: Mt. Hood. IDAHO: Lake Wala. CALIFORNIA: Weber Lake, Sierra Co. (CNC); Grass Lake, Tahoe; Tioga Road; Yosemite. COLORADO: Aspen (AMNH). NEW MEXICO: Cloudcroft. ARIZONA: Santa Catalina Mts. (AMNH and USNM).

2. 2. 10. 15. Cyrtopogon dasyllis Williston.

Cyrtopogon dasyllis Williston, 1893: 66.

Males have maculate wings, but the pattern is different from that of bimacula Walker: specimens of dasyllis Williston have one black macula on the apex of the wing, and narrow one around the second cubital vein (Fig. 157); the abdomen is provided with yellowish long pile on the entire first four abdominal segments, black on the remaining; hypandrium of the male is provided with a pair of spine-like structures (Fig. 236).

The wings of the females are not distinctly maculate, but are slightly infuscated





in the place of the maculae.

Distribution - This species ranges from Alaska and the Northwest Territories, south to Oregon, and Colorado.

Number of specimens examined - 16.

Localities - ALBERTA: Banff (UA, CNC, and AMNH); Lake Louise (CNC); Jasper (CNC).

Other localities - ALASKA: Skagway (AMNH). NORTHWEST TERRITORIES: Cameron Bay, Great Bear Lake (CNC). YUKON TERRITORIES: Whitehorse (CNC). BRITISH COLUMBIA: Davie Lake (CNC); Robson (CNC); Shaswap (CNC); Tuktakamin (CNC); Kaslo. WASHINGTON: Mt. Rainier, Sunrise; Mt. Rainier, Paradise Inn; Mt. Rainier, White River Camp; Randle. OREGON: Strawberry Mt., Grant Co. IDAHO: COLORADO: Deer Mt.

#### 2. 2. 11. Genus Eucyrtopogon Curran.

Eucyrtopogon Curran, 1923: 95. Type species Cyrtopogon nebulo Osten Sacken, 1877.

This genus is confined to the Nearctic Region, and includes 11 species (Hull, 1962). In Alberta, Eucyrtopogon is represented by seven species, one of them, incompletus, is new.

Description - Face, front, and vertex, broad, narrower at antennal base; front less slanting than in Cyrtopogon Loew; third antennal segment elongate, tapering apically (Fig. 131); antennal style half as long as third segment; first two antennal segments oval, subequal; proboscis short, stout (Fig. 61); palpi two-segmented, long (Fig. 43).

Thorax slightly elongate; mesonotum pilose; dorsocentral bristles weak; metapleural hairs always present.

Legs slender; femora and tibiae subequal, the former thicker; bristles short, strong on tibiae and tarsi; pile present on tibiae; claws strong, long.



Wings hyaline, maculate in certain areas (Figs. 158, 159); one and a half times as long as abdomen; microtrichiae usually present, but absent from albibarbis Curran.

Abdomen semiparallel, curved dorsally, about one and a half times as long as thorax; posterior corners of segment 1 to 6 always pilose, seventh segment in some species bare; pile longer on sides, short and appressed on dorsum; male genitalia black, concealed, almost constant in form within the genus (Figs. 238–242); acanthophorites with four to six pairs of spines. Sexual dimorphism very slight, present in some species on the pattern of pile and hairs, pattern of costal setulae, and pollen of the abdomen.

## 2. 2. 11. 1. Key to the species of Eucyrtopogon Curran of Alberta.

1. Male ..... 2
- Female ..... 7
2. Wing clear, microtrichiae absent ..... albibarbis Curran
- Wing with microtrichiae ..... 3
3. Middle line of thorax with very conspicuous mane-like white and black hairs  
..... comantis Curran
- No condensation of pile to form a mane ..... 4
4. Wings with a double row of setulae, black, curved ..... 5
- Costal setulae pale brownish or orange, not curved ..... 6
5. From side aspect mystax with ends of hairs pale yellowish or white .....  
..... diversipilosus Curran
- Mystax with ends of hairs brownish ..... nebulosus Osten Sacken
6. Costal setulae end between tip of subcosta and first longitudinal vein .....  
..... incompletus n. sp.
- Costal setulae complete, reaching wing tip ..... calcarata Curran  
or spinigera Curran





- 7. Wings without microtrichiae ..... albibarbis Curran
- Microtrichiae present ..... 8
- 8. Seventh abdominal segment without sericeous pollen ..... nebulosus Osten Sacken
- Seventh abdominal segment with sericeous pollen ..... 9
- 9. Mesonotum with acrostichal white mane anteriorly ..... 10
- Mesonotum without such mane ..... 11
- 10. Front tibia and all tarsi with prominent white mane-like pile .... comantis Curran
- Front tibia and tarsi with less conspicuous mane-like pile .... incompletus n. sp.
- 11. Sericeous pollen on sixth abdominal segment extending broadly almost to base  
of segment ..... calcarata Curran
- Pollen not extending over two-thirds the distance to base, or only very narrowly  
so on sides ..... 12
- 12. Acanthophorite with four pairs of spines ..... diversipilosus Curran
- Acanthophorite with five or six pairs of spines ..... spinigera Curran

#### 2. 2. 11. 2. Eucyrtopogon comantis Curran.

Eucyrtopogon comantis Curran, 1923: 116-117.

This species is recognized by the presence of the mane-like white pile on the acrostichal area of the mesonotum; this vestiture is also present in albibarbis Curran, but these two species are easily distinguished by the presence or absence of microtrichiae of the wings.

Description - Sides of face with white mane; each bristle of mystax bicolored, brownish black basally, yellowish white apically; ocellar and antennal bristles brownish yellow.

Legs black; coxal pile yellowish; femoral pile long, white, appressed on dorsal sides; pile on front and middle tibiae white, short, appressed, mane-like, half as long as tibia diameter, continued to dorsal sides of tarsi, less conspicuous on hind pair; pile



in females longer; claws black.

Posterior corners of fourth, fifth, and sixth abdominal segments with bristle-like brownish hairs, absent from females; venter white pilose; male genitalia black; acanthophorite with five pairs of spines.

Distribution - This species is known from British Columbia and Alberta, south to Colorado.

Number of specimens examined - Holotype (CNC) and nine additional specimens.

Localities - ALBERTA: Fabyan, Campsite (UA); Medicine Hat (UA and AMNH); Calgary (CNC); Magrath (CNC).

Other localities - BRITISH COLUMBIA: Chilcotin (type locality; CNC); Vernon (CNC); Departure Bay (CNC). WYOMING. COLORADO: Maez Creek, Huerfano Co. (USNM); Wet Mts., Huerfano Co. (USNM).

### 2. 2. 11. 3. Eucyrtopogon albibarbis Curran.

Eucyrtopogon albibarbis Curran, 1923: 117.

This species is similar to comantis Curran, but is readily distinguished by the absence of villi or microtrichiae from the wings.

Description - Upper two third of face white pilose; each bristle of mystax bicolored, black basally, white apically.

Mesonotum is provided with acrostichal mane.

Dorsal faces of front tibia and of all tarsi with appressed mane-like white pile, of equal size in both sexes.

Distribution - This species is known from Alberta and Saskatchewan.

Number of specimens examined - Holotype (CNC) and 16 additional specimens.

Localities - ALBERTA: Fabyan, Campsite (UA); Medicine Hat (CNC); Calgary (UA).

Other localities - SASKATCHEWAN: Saskatoon (CNC); Moose Jaw (type





locality; CNC); Regina (USNM).

#### 2. 2. 11. 4. Eucyrtopogon incompletus new species.

This species resembles comantis Curran and albibarbis Curran, but differs in the following respects: the male has curved costal setulae on the wing, which end a considerable distance before the wing tip; the front tibia of the females is without obvious white mane.

This species is distinguished from comantis by the following characters: mesonotal pile less abundant, acrostichal mane less obvious; costal setulae not complete, ending between subcosta and first longitudinal vein; costa from this point to apex bare; front tibia of female without obvious white mane.

From albibarbis Curran, it is distinguished by the following characters: microtrichiae present on wings of both sexes; costal setulae present.

Description - Male: Face white pollinose; mystax black, mixed with white pile on upper and lateral margins; front, vertex, and occiput brownish pollinose; hairs on front, vertex, and occiput brownish; six ocellar bristles black half basally, white apically; first two antennal segments subequal, black, white pilose; third antennal segment missing; beard and pile on proboscis and palpi, white.

Thorax more or less similar to comantis Curran, but acrostichal pile shorter.

Legs similar to comantis Curran.

Wings with microtrichiae, costal setulae end between subcosta and first longitudinal vein; shape and color of costal setulae similar to those of comantis Curran.

Abdomen similar to comantis Curran.

Female: pile on front tibia normal, not produced into long, mane-like pile as in comantis Curran; the remaining similar to comantis Curran.

The name incompletus has been chosen for this species on the basis of the shape of the incomplete costal setulae.



Holotype: Male, Cypress Hills, Alberta, 26.V.1964 (S. Adisoemarto); deposited in CNC.

Paratypes: Two females, same locality, 24.V.1964 (S. Adisoemarto); deposited in UA.

2. 2. 11. 5. Eucyrtopogon calcarata Curran.

Eucyrtopogon calcarata Curran, 1923: 119.

The males of this species are readily recognized by the costal setulae, which are longer than the diameter of the costa, and by the presence of a conical tubercle on the anterior apex of the hind coxa. The sixth abdominal segment of the females is provided with broad sericeous pollen on the sides.

Distribution - This species is known from British Columbia and Alberta.

Number of specimens examined - Holotype (CNC) and 12 additional specimens.

Localities - ALBERTA: Waterton Lakes (CNC); Cowley (UA); Coleman (CNC); Banff (type locality; CNC); Jasper (UA); Edmonton (UA).

Other localities - BRITISH COLUMBIA: Robson (CNC); Cranbrook (CNC); Princeton (CNC).

2. 2. 11. 6. Eucyrtopogon spinigera Curran.

Eucyrtopogon spinigera Curran, 1923: 117-118.

The males are very similar to calcarata Curran, but the females are distinguished by the size of the pollinose marking on the sixth abdominal segment, being less than two-thirds of the length of the segment.

Distribution - This species is known from the Northwest Territories to Alberta and British Columbia.





Number of specimens examined - Holotype (CNC) and 10 additional specimens.

Localities - ALBERTA: Calgary (CNC); Cowley (CNC); Medicine Hat (UA).

Other localities - BRITISH COLUMBIA: Victoria (type locality; CNC); Pass Creek (CNC); Copper Mtn. (CNC).

#### 2. 2. 11. 7. Eucyrtopogon diversipilosis Curran.

Eucyrtopogon diversipilosis Curran, 1923: 118.

This species is similar to spinigera Curran. The males are distinguished by differences in costal setulae: in diversipilosis Curran, they are black and curved; in spinigera Curran, they are orange and not curved.

Distribution - This species is known from British Columbia and Alberta.

Number of specimens examined - Holotype (CNC) and four additional specimens.

Localities - ALBERTA: Banff (CNC); Coleman (CNC).

Other localities - BRITISH COLUMBIA: Chilcotin (type locality; CNC); Lavington (CNC); Wilmer (CNC).

#### 2. 2. 11. 8. Eucyrtopogon nebulo Osten Sacken.

Cyrtopogon nebulo, Osten Sacken, 1877: 309.

Eucyrtopogon nebulo Curran, 1923: 120-121.

This species is similar to diversipilosis Curran, especially the males, but the females are readily distinguished by the absence of the pollen from the seventh abdominal segment.

Distribution - This species ranges from British Columbia and Alberta, south to California, Wyoming, and Utah.



Number of specimens examined - Six.

Localities - ALBERTA: Waterton (CNC).

Other localities - BRITISH COLUMBIA: Royal Oak (CNC); Duncan (CNC); Trinity Valley (CNC); Cranbrook (AMNH). IDAHO: Moscow (USNM). WYOMING: Jackson's Lake (AMNH). UTAH: Logan Canyon (USNM); Logan Peak (USNM). CALIFORNIA.

## 2. 2. 12. Genus Comantella Curran.

Comantella Curran, 1923: 93. Type species: Cophura fallei Back, 1909.

This genus is similar to Eucyrtopogon Curran, but is distinguished by the presence of a curved spur on the apex of the front tibia. The male genitalia show similarity in general appearance to those of Eucyrtopogon Curran (Figs. 243-247).

Four species are included in this genus, all found in the Nearctic Region. In Alberta, two species are known.

The species of this genus are very similar to one another. James (1937) has presented a key to the species of this genus.

### 2. 2. 12. 1. Key to the species of Comantella Curran of Alberta.

- Thoracic mane on a clearly defined black vitta ..... rotgeri James
- Medial vitta of thorax at most poorly defined ..... fallei Back

### 2. 3. 13. 2. Comantella fallei Back.

Cophura fallei Back, 1909: 378-379.

Comantella maculosa Curran, 1923: 93-94.

Comantella fallei Curran, 1923: 311-312.

This species is strikingly similar to rotgeri James. For the diagnostic characters,





see James (1937).

Ecological notes - This species has been recorded from Medicine Hat, Alberta, in late winter, and early and mid-fall.

Distribution - This species ranges from Alberta southeast to Colorado and Nebraska.

Number of specimens examined - 12.

Localities - ALBERTA: Medicine Hat (UA and CNC).

Other localities - WYOMING. COLORADO: Denver (CNC). NEBRASKA: Crawford (CNC).

## 2. 2. 12. 3. Comantella rotgeri James.

Comantella rotgeri James, 1937: 61.

This species is distinguished from fallei Back on the following characters: medial vitta of thorax definitely demarcated, mystax coarser, not white tipped, pale hairs and bristles deeper yellow, pale pile coarser, less dense, ventral pile coarser, more extensively black.

Distribution - This species ranges from Alberta to New Mexico.

Number of specimens examined - Two.

Localities - ALBERTA: Medicine Hat (USNM).

Other localities - COLORADO: Rio Seco, Costilla Co. NEW MEXICO.

## 2. 3. SUBFAMILY LAPHRIINAE

This subfamily is represented by three genera, which belong to two tribes. They live either in coniferous or parkland forests.

Laphria Meigen and Bombomima Enderlein are difficult to distinguish, but there is a tendency in Bombomima Enderlein to have a more rounded abdomen. There is also a difference in the shape of the pseudoclaspers of these two groups: in Laphria Meigen, they



are relatively simple; in Bombomima Enderlein, they are forked (Figs. 266, 270, 273, 276).

Before the genus Bombomima Enderlein was erected, its species were treated under Dasyllis Loew. Banks (1917) stated that Dasyllis Loew (s. l.: Dasyllis Loew and Bombomima Enderlein) was an offshoot of the genus Laphria Meigen. Hull (1962) placed these genera in different tribes.

### 2. 3. 1. Key to the genera of Laphriinae of Alberta.

1. Proboscis on apical half compressed dorsocentrally (Fig. 62); third antennal segment dilated, as long as first two segments together (Fig. 132); wings with first submarginal cell divided into two (Fig. 160) ..... Pogonosoma Rondani
- Proboscis compressed laterally; third antennal segment slender (Fig. 133), longer than first two segments together; first submarginal not divided (Fig. 161) .... 2
2. Abdomen robust, more or less rounded, densely pilose; pile on mesonotum covers ground color; pseudoclasper forked (Fig. 266) ..... Bombomima Enderlein
- Abdomen parallel-sided, less pilose; pile on mesonotum not entirely covers ground color; pseudoclasper simple (Fig. 251 pcl) ..... Laphria Meigen

### 2. 3. 2. Genus Pogonosoma Rondani.

Pogonosoma Rondani, 1856: 160. Type species: Asilus maroccanum F., 1794.

This is a small group. In the Nearctic Region, this genus has only three species. Cresson (1921) treated melanoptera Wiedemann as conspecific with dorsata Say, but Hull (1962) treated them as two different species. The third species is ridingsi Cresson.

Description - Face thick, with slight slit under antennal base; gibbosity rounded, starting at about middle of face (Fig. 23); vertex deeply excavated (Fig. 24); ocellar plate with one or two pairs of bristles; bristles or bristle-like hairs present on orbital margin of front (opposite to antennal base, Fig. 24); first antennal segment stout,





second shorter and smaller in diameter, third narrow on base, dilated and oval apically, bristles present on apical lower side of first segment (Fig. 132); proboscis compressed dorsocentrally, pointed apically; palpi two-segmented, second segment flattened, thin, and scoop-like (Fig. 47 ).

Thorax opaque, thinly pollinose; hairs present on prothorax, posterior half of mesopleuron, upper half of pteropleuron, and on mesonotum scanty, semierect; bristle-like hairs present on metapleuron; dorsocentral bristles absent.

Femora slightly thicker subapically; tibiae slightly curved, provided with hairs, hind pairs with bristles; bristles present on tarsi; second to fourth segments of tarsus heart-shaped; claws strongly curved apically; empodium long.

Wings longer than abdomen (Fig. 160), evenly covered with microtrichiae, sometimes infuscated along veins; marginal cell closed with long stalk; first submarginal cell divided by crossvein; first posterior cell open or closed, sometimes with stalk; fourth posterior cell closed with stalk; anterior crossvein at basal one-third of discal cell; alula well developed.

Abdomen semiparallel in males, slightly wider subapically in females; first five segments with two to four bristles on middle of each side; pile short, longer on venter, subappressed on dorsum.

Strickland (1938) recorded one species, ridingsi Cresson, from Alberta.

## 2. 3. 2. 1. Key to the species of Pogonosoma Rondani of Alberta.

- Beard on lower orbital margin black; coxal pile mixed black and white; front femoral and tibial hairs entirely black; metapleural hairs in female black; abdominal hairs in female entirely black ..... stricklandi n. sp.
- Beard entirely white; coxal pile entirely white; front femoral and tibial hairs mixed black and white; metapleural hairs in female white; abdominal hairs in female white on first three segments ..... ridingsi Cresson



2. 3. 2. 2. Pogonosoma ridingsi Cresson.

Pogonosoma ridingsi Cresson, 1920: 214-215.

This species is similar to dorsata Say (Cresson, 1920), but is distinguished from the latter mainly by the difference of the color of the pile, hairs and bristles.

Distribution - This species ranges from British Columbia southeast to California and Texas. Strickland (1938) included this species in his list. So far, I have seen only a female specimen of Pogonosoma from Alberta, which is stricklandi new species.

Number of specimens examined - Holotype (USNM) and 10 additional specimens.

Localities - BRITISH COLUMBIA: Robson (CNC and USNM); Copper Mtn. (CNC); Kamloops (CNC); Departure Bay (CNC); Victoria (CNC). CALIFORNIA: Plumas Co. COLORADO: Florissant (type locality; USNM). TEXAS: Waco (USNM).

2. 3. 2. 3. Pogonosoma stricklandi new species.

This species is easily distinguished from ridingsi Cresson by the presence of black pile on the lower orbital margin and the entirely black pile or hairs on the front and the middle legs. The female differs from those of ridingsi Cresson on the color of the metapleural hairs, entirely black, and the abdominal pile, also entirely black.

Description - Female. Pile, hairs, and bristles on face white, few black bristles on middle of gibbosity; beard white, mixed with black on maxillae; occipital pile white on lower half, black on upper half and on orbital margin; frontal, vertical, and ocellar pile black; ocellar bristles black; antennal first two segments orange, bristles black, pile white on lower sides, black on upper sides.

Thorax white pollinose; pile mostly black, white on proepimeron, and on anterior and posterior corners of mesopleuron; metapleural hairs black; all bristles black.

Legs black, coxae white pollinose; pile, hairs, and bristles black, few white pile on front coxae, few white hairs on subapical dorsal side of hind femur.





Wings covered with brown microtrichiae; halteres black.

Abdominal pile, hairs, and bristles entirely black.

This species is named in honor of the late Dr. E. H. Strickland.

Holotype: Female, Waterton, Alberta, 12.VII.1923 (E. H. Strickland); deposited in CNC.

### 2. 3. 3. Genus Bombomima Enderlein.

Bombomima Enderlein, 1914. 253. Type species: Laphria fulvithorax Fabricius, 1805.

This genus resembles Laphria Meigen. The distinguishing characters are, so far, not satisfying. The females of Bombomima usually have a broad abdomen, but the abdomen of the males is slender as in Laphria Meigen. Another character which may be used for distinguishing these two groups is the shape of the pseudoclaspers. Pseudoclaspers of 13 species of Bombomima and 11 species of Laphria have been examined. In Laphria sackeni Wilcox, the pseudoclasper is not as in the other species of Laphria Meigen, but rather provided with a "tooth", although not as complex as those of Bombomima Enderlein (Figs. 266, 270, 273, 276).

This genus is known only from the Nearctic Region. In Alberta, five species have been recorded, most of them were from the Montane or Subalpine region.

#### 2. 3. 3. 1. Key to the species of Bombomima Enderlein of Alberta.

1. Third and fourth, sometimes also fifth, abdominal segments with vivid orange red hairs posteriorly; the succeeding segments with yellow hairs .....  
 ..... fernaldi Back
- Abdominal hairs unicolored, yellow ..... 2
2. Humerus, and usually also pronotum and upper occiput with black hairs ..... 3
- Humerus, pronotum, and upper occiput with pale yellow hairs ..... 4



- 3. Two apical abdominal segments entirely yellow haired ... columbica Walker
- Three apical abdominal segments yellow haired ..... partitor Banks
- 4. Posterior half of mesonotum vivid orange red haired, contrasting with yellow  
hairs of anterior half ..... insignis Banks
- Mesonotum uniformly with pale yellow hairs ..... posticata Say

2. 3. 3. 2. Bombomima columbica Walker.

Laphria columbica Walker, 1868: 338

Bombomima columbica Hull, 1962: 325

This species is similar to partitor Banks, but is distinguished by the absence of yellow pile from the fourth abdominal segment. The male genitalia of both species are similar to one another (Figs. 264-270).

Distribution - This species ranges from British Columbia and Alberta, south to California.

Number of specimens examined - 14.

Localities - ALBERTA: Grimshaw (UA).

Other localities - BRITISH COLUMBIA: Robson (CNC); Sugar Lake (CNC); Agassiz (CNC); Victoria (CNC). WASHINGTON: Ellensburg (AMNH). OREGON. CALIFORNIA.

2. 3. 3. 2. Bombomima partitor Banks.

Dasyllis partitor Banks, 1917: 54.

Bombomima partitor Hull, 1962: 325

This species is easily recognized by the pattern of the pile. The pile is unicolored yellow; on the anterior half of the mesonotum it is erect, and from dorsal view the ground color of the mesonotum is visible; on the posterior half of the mesonotum,





the pile is decumbent, and conceals the ground color. On the abdomen the pile is present on the last five segments.

Distribution - This species is known from British Columbia and Alberta, south to Idaho and Oregon.

Number of specimens examined - 36.

Localities - ALBERTA: Banff (CNC); Banff, Lake Minnewanka, Campsite (UA); Seebe (CNC); Nordegg, North Saskatchewan River Valley (UA).

Other localities - BRITISH COLUMBIA: Robson (CNC); Copper Mtn (CNC); Chilcotin (CNC); Sugar Lake (CNC); Seton, Lillooet (CNC); Uclucet (CNC); Nicola (CNC); Douglas Lake (CNC); Shuswap Falls (CNC); Ft. St. James (CNC); Ft. Steele (CNC); Westwold (CNC); Chase (CNC); Vernon (CNC); Keremeos (CNC); Kelowna (CNC); Penticton (CNC); Summerland (CNC). IDAHO: Victor. WASHINGTON. OREGON.

### 2. 3. 3. 3. Bombomima fernaldi Back.

Dasyllis fernaldi Back, 1904: 290

Bombomima fernaldi Bromley, 1929: 160.

This species is similar to columbica Walker and partitor Banks, but is distinguished by the color pattern of the pile and the male genitalia (Figs. 271, 273).

Variation - The pile on the presternum varies from entirely black to mixed black and yellow; on the mesopleuron, the pile is of three different patterns, entirely black, entirely yellow, or mixed black and yellow.

Distribution - This species ranges from Alberta and British Columbia, south to Arizona and New Mexico.

Number of specimens examined - 127.

Localities - ALBERTA: Jasper (CNC); Waterton (CNC and UA).



Other localities - BRITISH COLUMBIA: Robson (CNC); Revelstoke Mtn. (CNC); Lillooet (CNC); Victoria (CNC); Departure Bay (CNC). WASHINGTON. OREGON. IDAHO: Moscow Mts. (AMNH). WYOMING: Yellowstone (AMNH); Jackson (AMNH). UTAH. COLORADO: Summit Road (AMNH); Aspen (AMNH); Ouray (AMNH); Electra Lake (CNC); Pingree Park (AMNH). NEW MEXICO: Santa Fe Canyon (AMNH). ARIZONA: Flagstaff (AMNH); Grand Canyon (AMNH); San Francisco (AMNH). MONTANA: Glacier Park (UA).

### 2. 3. 3. 5. Bombomima posticata Say.

Laphria posticata Say, 1824: 374

Bombomima posticata Bromley, 1929: 160.

This species is recognized by the uniformly yellow pilose mesonotum. The mesonotal pile is more or less decumbent on the mesonotum, erect only on the acrostichal line and transverse suture, from dorsal view appears as an inverted-T black marking.

Bromley (1929) described two varieties, brunnea and scutellaris, which were treated as different species by Hull (1962). The specimens found in Alberta belong to scutellaris Bromley, but here they are treated as posticata Say, because the difference between these two forms is slight: scutellar bristles are black in posticata Say, and yellow in scutellaris Bromley.

Distribution - This species ranges from Alberta and the Northwest Territories, east to New Brunswick, and south to New York and Connecticut.

Number of specimens examined - Holotype of scutellaris Bromley (CNC) and 26 additional specimens.

Localities - ALBERTA: Lesser Slave Lake (UA); Cross Lake (UA); Nordegg (CNC).

Other localities - NORTHWEST TERRITORIES. MANITOBA: Victoria Beach (CNC); Sandilands (CNC). ONTARIO: Lake Nipigon (CNC); Sadbury (CNC); Ottawa (CNC); Guelph (CNC); Orilla (CNC); Sand Lake (CNC). QUEBEC: Aylmer (CNC);





Fairy Lake (CNC). NEW BRUNSWICK: St. Leonard (CNC); Nerepis (CNC). MAINE: Great Pond (USNM). NEW HAMPSHIRE: Franconia (AMNH). MASSACHUSETTS: Amherst (USNM); Boston (AMNH). NEW YORK: North Elba (AMNH). CONNECTICUT: Avon (AMNH).

#### 2. 3. 3. 6. Bombomima insignis Banks.

Dasyllis insignis Banks, 1917: 54.

Bombomima insignis Hull, 1962: 325.

This species is similar to posticata Say, but is distinguished by the presence of orange pile on the posterior half of the mesonotum. The male genitalia of both species are in general similar to one another (Figs. 274-276).

Distribution - This species ranges from Alberta to Nova Scotia, south to Minnesota.

Number of specimens examined - 21.

Localities - ALBERTA: Bilby (UA and CNC); Chipewyan (CNC).

Other localities - SASKATCHEWAN: Attons Lake (CNC); Weskesin Lake (CNC). MANITOBA: Aweme (CNC); Teulon (CNC). MINNESOTA: Duluth (AMNH). ONTARIO: Lake Nipigon (CNC). QUEBEC: Norway Bay (CNC). NOVA SCOTIA: Kentville (CNC).

#### 2. 3. 4. Genus Laphria Meigen.

Laphria Meigen, 1803: 270.

In this genus the abdomen tends to have parallel sides in both sexes, but in janus McAtee, the abdomen of the females broadens slightly, as in the species of Bombomima Enderlein. The pseudoclasper in the male genitalia of janus McAtee, has a projection (Fig. 261). This same form of pseudoclasper is found in Laphria vultur Osten-



Sacken and L. sackeni Wilcox (Figs. 262-263).

The mesonotal and abdominal pile varies from very sparse and short, as in felis Osten Sacken and xanthippe Williston, or appressed, as in aimatis McAtee and gilva L., to erect, as in janus McAtee.

There are nine species known from Alberta. Most were collected near the coniferous forests.

## 2. 3. 4. 1. Key to the species of Laphria Meigen of Alberta.

1. Dorsum of abdomen usually without pile, but if pile is present it is sparse and very appressed; third antennal segment cylindrical (Fig. 133) ..... 2
  - Abdominal pile erect, at least on sides; third antennal segment dilated subapically (Fig. 137) ..... 3
2. Abdomen entirely black; femora entirely orange; third antennal segment five times as long as second (Fig. 136) ..... sadales Walker
  - Abdomen black anteriorly, orange posteriorly; at least anterior femora entirely black; third antennal segment seven times as long as second (Fig. 133) .....  
..... xanthippe Williston
3. Ground color of abdominal dorsum entirely black ..... 5
  - Abdominal dorsum with triangular orange markings ..... 4
4. Three abdominal segments with orange markings, sixth segment black .....  
..... gilva Linnaeus
  - Four abdominal segments with orange markings, sixth segment with orange marking ..... aimatis McAtee
5. Beard and pile on coxae white; bristles on face mainly black, mixed with yellow pile mane ..... 7
  - Beard and pile on coxae yellow or orange; bristles on face mainly yellow or orange ..... 6





- 6. Bristles on face orange and black; humeral hairs orange or yellow .....  
       ..... vivax Williston
- Bristles on face orange yellow; humeral hairs black in males, mixed with orange in  
    females ..... janus McAtee
- 7. Pile and mane on face yellow or orange; abdominal pile concolorous orange  
    yellow ..... scorpio McAtee
- Pile and mane on face white; pile on first abdominal segment white or paler than  
    the rest of abdominal pile ..... 8
- 8. Metapleural hairs dark brown or black; all or few of scutellar bristles black .....  
       ..... aetatus McAtee
- Metapleural hairs white; scutellar bristles yellowish ..... index McAtee

## 2. 3. 4. 2. Laphria xanthippe Williston.

Laphria xanthippe Williston, 1884: 31-32.

This species is easily recognized by the almost bare abdomen, and the reddish brown hind femora. There is slight sexual dimorphism in this species. The reddish color of the abdomen and of the hind femur is broader in the males. The beard is white in the males and black in the females. The facial mane is entirely white in the males, mixed with black in the females.

Distribution - This species ranges from British Columbia and Alberta, south to Oregon, and east to Colorado.

Number of specimens examined - 26.

Localities - ALBERTA: Banff (CNC); Banff, Lake Minnewanka, Campsite (UA); Bow River Forest, Wilkinson Creek (UA); Waterton Lakes (CNC).

Other localities - BRITISH COLUMBIA: Revelstoke Mtn. (CNC); Fort Steele (CNC); Hedley, Nickel Plate (CNC); Jesmond (CNC). OREGON: Mt. Hood (USNM).



WYOMING: Yellowstone Nat'l Park (AMNH). COLORADO: Electra Lake (AMNH).

2. 3. 4. 3. Laphria sadales Walker.

Laphria sadales Walker, 1849: 378-379.

Dasyllis pubescens Williston, 1884: 32.

Laphria sadales McAtee, 1918: 161.

This species is similar to xanthippe Williston, but is easily distinguished by the entirely black abdomen and reddish legs, except the black coxae. Sexual dimorphism is very slight. The abdomen of the males is paler posteriorly, with golden yellow dorsal pile. The pile on the abdomen of the females is entirely black.

Distribution - This species ranges from Alberta to California and Colorado, east to New Hampshire and Connecticut. The western and eastern populations are probably connected by geographically intermediate populations in the Boreal forests.

Number of specimens examined - 22.

Localities - ALBERTA: Assinneau River, near Lesser Slave Lake (UA); Banff (CNC); Clymont (UA); Waterton (UA).

Other localities - BRITISH COLUMBIA: Robson (CNC); Trinity Valley (CNC); Nicolum River; Hope Mts.; Kaslo. WASHINGTON: Moscow Mts. (USNM); Mt. Rainier (USNM); Electron (USNM); Olympia; Pullman. OREGON: Strawberry Mt. (AMNH); Marys Peak (AMNH); Mt. Hood. IDAHO: Long Valley, Alpha (UA). WYOMING: Yellowstone (AMNH). CALIFORNIA: Towle (AMNH); Fieldbrook; Humboldt Co. COLORADO: Chatanqua (USNM). ONTARIO: (CNC). QUEBEC: Laniel (CNC). VERMONT: Rutland; Chittenden. NEW HAMPSHIRE: Franconia (AMNH); White Mts.; Mt. Washington (AMNH). MASSACHUSETTS: Southbridge (USNM). CONNECTICUT: Avon (AMNH). NEW YORK: Axton.





2. 3. 4. 4. *Laphria scorpio* McAtee.

Laphria scorpio McAtee, 1918: 163-164.

This species can be distinguished from the two preceeding species by the presence of erect pile on the abdomen, and from the other species of the genus by the black bristles on the face and the concolorous abdominal pile.

Description - Facial protrusion near antennal base not too obvious (Fig. 25); a row of black bristles present on each facial submargin; facial mane and pile orange; beard white; hairs on first palpal segment white, on second black; third antennal segment blade-shaped, without groove (Fig. 137).

Thorax black; mesonotum and scutellum shiny, the rest yellowish white pollinose; pile mostly black, white on propleuron and anterior corner of sternopleuron, and golden yellow, appressed, on mesonotum and scutellum; metapleural hairs yellow mixed with few black.

Legs black; pile on coxae, on lower sides of femora, and on front and middle tibiae of female, white; hairs and bristles black; tomentum on tarsi and frontal tibiae, brownish; claws black, empodium brownish orange.

Wings covered with brownish microtrichiae, darker along veins, halteres yellow.

Abdomen black; male sixth segment elevated medio-posteriorly, with a pair of stumpy projections, seventh also with a median projection, which more or less fits into a space between projections on sixth segment (Figs. 99, 100); pile short, orange, appressed on dorsum; venter orange pilose; male genitalia black (Figs. 253-258).

Ecological notes - In Alberta, this species was collected on the edge of coniferous forest.

Distribution - This species has been recorded mostly from eastern central North America, from New Hampshire to Virginia, Ontario and Alberta.



Number of specimens examined - Holotype (AMNH) and 19 additional specimens.

Localities - ALBERTA: Kinuso, near Lesser Slave Lake (UA).

Other localities - ONTARIO: Trenton (CNC); Lake Nipigon (CNC). QUEBEC: Laniel (CNC). VERMONT: Camel's Hump. NEW HAMPSHIRE: White Mts. (type locality; USNM and AMNH); Mt. Washington (AMNH). NEW YORK: North Elba (AMNH); Chateaugay. PENNSYLVANIA: Springboro (USNM). VIRGINIA: Skyland (USNM).

## 2. 3. 4. 5. Laphria aeatus Walker.

Laphria aeatus Walker, 1849: 381.

This species resembles scorpio McAtee, but the color of the facial mane and pile immediately distinguishes it from the latter. Other diagnostic characters are as follows: the third antennal segment has a narrow apical slit (Fig. 138), and the abdominal pile is white on the first segment, and yellow on the remaining.

Ecological notes - This species is found near coniferous forests, in northern Alberta.

Distribution - This species ranges from Vermont and Ontario to Alberta.

Number of specimens examined - Five.

Localities - ALBERTA: Assineau River, near Lesser Slave Lake (UA).

Other localities - ONTARIO: Lake Nipigon (CNC). VERMONT: Laurel Lake (USNM).

## 2. 4. 4. 6. Laphria index McAtee.

Laphria index McAtee, 1918: 164.

This species is similar to aeatus Walker, but is distinguished by the longer mystax, the pattern of the mesonotal pile, triangular from dorsal view, and entirely yellow scutellar bristles.





The species scorpio McAtee, index McAtee, and aeatus Walker, have one character in common: the tubercles on the ends of the sixth and the seventh abdominal segments.

Ecological notes - In Alberta, this species was collected from the same habitat as that of Laphria aeatus Walker.

Distribution - This species is known from eastern central North America and Alberta.

Number of specimens examined - Holotype (USNM) and 29 additional specimens.

Localities - ALBERTA: Assineau River, near Lesser Slave Lake (UA).

Other localities - MANITOBA: Aweme (CNC). ONTARIO: Lake Nipigon (CNC); Lake Abitibi (CNC); Point Pelee (CNC); Guelph (CNC); Jordan (CNC); Orilla (CNC); Bobcaygeon (CNC); Ottawa (CNC). QUEBEC: Aylmer (CNC); Chelsea (CNC); Montreal (CNC); Hemmingford (CNC); Wakefield (CNC); Qouey Hill (CNC). NEW YORK: Nepera Park Yonkers, Flushing (USNM); New York. CONNECTICUT: Avon (USNM). NEW JERSEY: Ramsey (USNM); Fort Lee. PENNSYLVANIA: Harrisburg (type locality; USNM); Linglestwon; Stoverdale. VIRGINIA: Dead Run.

## 2. 3. 4. 7. Laphria janus McAtee.

Laphria janus McAtee, 1918: 153-154.

This species is readily distinguished from the other species of Laphria Meigen of Alberta, by the bright orange color of the abdominal pile, and the yellow mesonotal pile. The abdomen of the female is rather rounded (Fig. 101), and is more or less similar to that of Bombomima Enderlein. The male genitalia are also similar to those of Bombomima Enderlein, but the fork of the pseudoclasper is not very strong (Fig. 261).

Ecological notes - Most of the specimens from Alberta were collected near coniferous forest.



Distribution - This species is known in eastern and western central North America. In the west it is distributed from Alberta to Washington, east to Colorado, and in the east it is recorded from Maine to Michigan.

Number of specimens examined - Holotype (USNM) and 23 additional specimens.

Localities - ALBERTA: High Level (UA); Kinuso (UA); Assineau River, near Lesser Slave Lake (UA); Cross Lake (UA); Bilby (UA); Edmonton (UA); Nordegg, North Saskatchewan River Valley (UA); Gorge Creek (UA); Banff (CNC).

Other localities - BRITISH COLUMBIA: Kaslo. WASHINGTON: Brodie. WYOMING. COLORADO: Creede; Tolland. ONTARIO: Heyden; Sault St. Marie. MICHIGAN: Isle Royal; Dickinson Co. NEW HAMPSHIRE: Mt. Washington (type locality; USNM); Mt. White; Ottolengui. NEW YORK. MAINE.

## 2. 3. 4. 8. Laphria vivax Williston.

Dasyllis vivax Williston, 1884: 30.

Laphria vivax McAtee, 1918: 156.

This species is recognized by the pattern of the pile. The pile is yellow; on the abdomen it is decumbent on the posterior margins and from a dorsal aspect it is visible only on the lateral and posterior margins.

Distribution - This species ranges from Alberta and British Columbia, south to Washington, and east to Colorado.

Number of specimens examined - 10.

Localities - ALBERTA: Banff (UA); Banff, Sulfur Mt. (CNC).

Other localities - BRITISH COLUMBIA: Robson (CNC); Chilcotin (CNC); Copper Mountain (CNC); Kaslo (CNC). WASHINGTON. IDAHO: Moscow (USNM). COLORADO: Marshall Pass (USNM); Summit Co.





2. 3. 4. 9. Laphria aimatis McAtee.

Laphria aimatis McAtee, 1918: 160-161.

This species is easily recognized by the presence of orange yellow markings on some of the abdominal segments.

Distribution - This species ranges from Alberta and British Columbia south to California and Colorado.

Number of specimens examined - holotype and 21 additional specimens.

Localities - ALBERTA: Brule Lake, near Jasper (USNM).

Other localities - BRITISH COLUMBIA: Robson (CNC); Midday Valley (CNC); Merritt (CNC); Vernon (CNC); Oliver (CNC). IDAHO: Moscow Mts. (AMNH); Krasel (USNM). CALIFORNIA: Baron (type locality; USNM); Midway (AMNH); Carrville, Trinity Co. (AMNH); Shasta (AMNH); Edwards; Sierra Nevada; Placerville. COLORADO: El Paso (USNM); Leadville (AMNH).

2. 3. 4. 10. Laphria gilva Linnaeus.

Asilus gilvus Linnaeus, 1758: 605.

Laphria gilva McAtee, 1918: 155-156.

This species is similar to aimatis McAtee, but is distinguished by a difference in the number of orange markings on the dorsum of the abdomen: three of Laphria gilva L., one on the third, fourth, and fifth segment; and the sixth segment is entirely black. The male genitalia are also different from those of aimatis McAtee: in gilva L., each of the superior forceps is provided with two lamellate appendages, while in aimatis McAtee, each forceps has one lamellate appendage (Figs. 259, 260).

Distribution - This species occurs in eastern as well as western central North America, and is also known from Europe.

Number of specimens examined - 65.



Localities - ALBERTA: Medicine Hat (UA); Whitla (CNC); Lethbridge (CNC); Castle Mountain (CNC); Banff (UA and CNC).

Other localities - NORTHWEST TERRITORIES: Cameron Bay, Great Bear Lake (CNC). BRITISH COLUMBIA: Robson (CNC); Copper Mt. (CNC); Tuktakamin (CNC); Vavenby (CNC). WASHINGTON. OREGON. MONTANA: Lame. WYOMING: Lander (AMNH). COLORADO: Empire; Estes Park. ARIZONA: St. Catalina Mts. (AMNH). ONTARIO: Sudbury (CNC); Ottawa (CNC); Thor Lake (CNC); Fort Williams (AMNH); Macbeth (AMNH); Sault St. Marie; Whitefish Point. QUEBEC: Fort Cologne (CNC); Cascapedia (CNC); Trinity Bay (CNC); Abbotsford (CNC); Laniel (CNC). NEW BRUNSWICK: Bathurst (CNC). NOVA SCOTIA: Baddeck (CNC). MASSACHUSETTS: Tyngsboro; Blanchard; Dedham; Beverly; Burgess. MICHIGAN: Alpena; Dickinson.

## 2. 4. SUBFAMILY LEPTOGASTRINAE

In 1909 Back recorded only one genus of this subfamily in North America north of Mexico. He presented a synopsis of 15 species. Later, additional genera were erected; Tipulogaster by Cockerell (1913), Psylonyx by Aldrich (1923), Beameromyia and Apachekolos by Martin (1957).

In Alberta, the subfamily is represented by one genus with two species, Leptogaster aridus Cole and L. coloradensis James.

### 2. 4. 1. Genus Leptogaster Meigen.

Leptogaster Meigen, 1803: 269. Type species: Asilus cylindricus De Geer, 1776.

Gonypes Latreille, 1804: 309. Type species: Asilus cylindricus De Geer, 1776.

This genus is recognized by the following combination of characteristics: the wings are without bands or spots, with five posterior cells, the legs are slender, but the femora are somewhat club-shaped (Fig. 85), and the pulvilli are absent.





Description - Head silvery white tomentose; face narrow, epistoma broader; front narrow, wider toward vertex; mystax present along epistomal margin; first antennal segment small, second wider, with short hairs on apical lower and upper sides, third elongate and attenuate, style long, slender, spine present (Fig. 139); palpi one-segmented, shining, clavate, borne on a tubercle (Fig. 46); occiput convex on lateral sides, few hairs present on lower side, few short bristles on upper side behind vertex.

Thorax white tomentose; mesonotum convex, slightly protruding anteriorly (Fig. 64); mesonotal vittae present, not reaching hind margin; two bristles present above wing base.

Legs shining, pale orange; coxae white pollinose; hind femora swollen distally; tibiae slender, hind pair gradually thicker apically (Fig. 85); basitarsi as long as second tarsal segments; claws long, empodium half as long as claws; pulvilli absent.

Wings shorter than abdomen, covered with microtrichiae; alula absent; all peripheral cells open; third branch of media and anterior branch of cubitus fused for a considerably long distance (Fig. 163); second branch of cubitus and second anal vein almost parallel; halteres brownish with long stalk.

Abdomen slender, elongate (Fig. 102); second segment much longer than first; posterior segments wider; posterior margin of first with one or more pairs of bristles; superior forceps of male genitalia with ventral excavation; ovipositor short.

#### 2. 4. 1. 1. Key to the species of Leptogaster Meigen of Alberta.\*

- Occipital bristles black; superior forceps of male genitalia without spine-like projection apically ..... aridus Cole
- Occipital bristles white, pale, or tinged with color; superior forceps of male genitalia with spine-like projection apically ..... coloradensis James

\* From Martin (1957)



2. 4. 1. 2. Leptogaster aridus Cole.

Leptogaster aridus Cole, 1919: 229.

According to Martin (1957), this species is easily recognized by the characteristics of the male genitalia.

Ecological notes - A female specimen was collected from Writing-on-Stone Provincial Park, an almost arid area, where the vegetation was short grass and cacti. This species was also found in association with Nerax bicaudatus Hine.

Distribution - This species is known from Alberta, and according to Martin (1957), is found along the Pacific coast and some localities in California.

Number of specimens examined - 10.

Localities - ALBERTA: Writing-on-Stone Provincial Park (UA).

Other localities - WASHINGTON: Yelm (UA). OREGON: Mt. Hood. CALIFORNIA: Big Bear Lake, Hannah Flats (AMNH); Idyllwild, San Jacinto Mts. (AMNH); Strawberry, Tuolumne Co.; Snowline Camp, Eldorado Co.; Yosemite Nat'l Park; Whitney Portal, Inyo Co.; Tanbark Flat, Los Angeles Co.; Glendale.

2. 4. 1. 3. Leptogaster coloradensis James.

Leptogaster coloradensis James, 1937: 14.

Variation in the pollen color was described by Martin (1957).

Distribution - This species ranges from Alberta to Kansas.

Number of specimens examined - One.

Localities - ALBERTA: Lethbridge (CNC).

Other localities - WYOMING. SOUTH DAKOTA: Cedar Canyon; Cottonwood; Buffalo; Highmore; Presho; Kennebec; Desmet; Gettysburg. COLORADO: Boulder (type locality); Berthoud Pass. KANSAS: Ellis Co.; Sheridan Co.





## 2. 5. SUBFAMILY ASILINAE

This subfamily is a highly specialized and complex group. Specialists have devoted much effort to define the genera.

The members of this group inhabit various kinds of habitats, such as open grass-land, sandy beach, and near coniferous forests.

## 2. 5. 1. Key to the genera of the Asilinae of Alberta.

1. Wing with three submarginal cells (Fig. 164) ..... Promachus Loew
- Wing with two submarginal cells ..... 2
2. Antennal style longer than third antennal segment (Fig. 141) ..... 3
- Antennal style as long as or shorter than third segment (Fig. 143) ..... 4
3. Facial gibbosity very prominent, bulging on top (Fig. 27); antennal style, including spine, at least twice as long as third segment (Fig. 141); scutellum at base less than twice its length (Fig. 70); male genitalia longer than high (Fig. 280); ovipositor almost three times as long as seventh abdominal segment (Fig. 114) ..... Nerax Hull
- Facial gibbosity almost flat on top (Fig. 26); antennal style one and a quarter as long as third antennal segment (Fig. 140); scutellum at base twice as long as its length (Fig. 69); male genitalia higher than long (Fig. 277); ovipositor less than twice as long as seventh abdominal segment (Fig. 113); ninth sternum provided with spines (Fig. 113) ..... Proctacanthella Bromley
4. Scutellum with bristles (Fig. 71, 72) ..... Asilus complex
- Scutellum without bristles (Fig. 73) ..... Negasilus Curran

2. 5. 2. Genus Promachus Loew.

Promachus Loew, 1848: 390. Type species: Asilus maculatus F., 1775.



Trupanea Macquart, 1838: 91. Type species: Asilus maculatus F., 1775. Preoccupied by Schrank, 1803, Diptera.

Telejoneura Rondani, 1863: 48. Unnecessary change of name.

Bactria Megerle (Ms) in Meigen, 1820: 307. Nomen nudum.

Promachus can be easily recognized by the character of the wing venation: three submarginal cells, with the radial crossvein near the middle of the first submarginal cell (Fig. 164).

There is one species, dimidiatus Curran, known in Alberta.

#### 2. 5. 2. 1. Promachus dimidiatus Curran.

Promachus dimidiatus Curran, 1927: 87-88.

According to Curran (1927) this species can be easily confused with bastardi Macquart, but is distinguished by the absence of black hairs from the first abdominal segment of the male. By comparing two females and one male of bastardi Macquart with six pairs of dimidiatus Curran, the following characters, which are more or less constant, have been found useful for distinguishing these two species: in dimidiatus Curran, the metanotal hairs and the hairs on the third abdominal segment, are entirely white, while in bastardi Macquart, the metanotal hairs are mostly black, and the hairs on the third abdominal segment are mixed black and white. Both species have black bristles on the first abdominal segment.

Distribution - This species ranges from Alberta to Manitoba, south to New Mexico.

Number of specimens examined - Holotype (CNC) and 18 additional specimens.

Localities - ALBERTA: Orion (UA and CNC); Milk River (CNC); Dunes (CNC).

Other localities - MANITOBA: Aweme (type locality; CNC), Onah (CNC).

COLORADO: Master, Plainview (USNM). NEW MEXICO: Arroyo, Pecos River (USNM).





2. 5. 3. Genus Proctacanthella Bromley

Proctacanthella Bromley, 1934: 96. Type species: Asilus cacopilogus Hine, 1909.

This group was separated from Asilus by Bromley (1934) on the base of the absence of hairs from the metanotal slopes, and by the cylindrical ovipositor, which is provided with a circlet of spines.

There are five species of this genus, all Nearctic, and in Alberta, this genus is represented by one species, cacopiloga Hine.

2. 5. 3. 1. Proctacanthella cacopiloga Hine.

Asilus cacopilogus Hine, 1909: 165-166.

Proctacanthella cacopiloga Bromley, 1934: 96.

Hine (1909) placed this species and leucopogon Williston in the Rhadiurgus group of the genus Asilus L. Curran (1924) was the first to realize that Asilus cacopilogus Hine was different from the other species of Asilus L., and suggested it belonged to Erax Scopoli.

The males of this species are easily recognized by the shape of the male genitalia (Figs. 277-279), but the females are hard to distinguish from one another.

Distribution - This species ranges from Alberta to Texas, and east to New Jersey.

Number of specimens examined - 32.

Localities - ALBERTA: Medicine Hat (UA); Orion (UA); Writing-on-Stone Provincial Park (UA).

Other localities - MANITOBA: Aweme (CNC). WYOMING: Lance Creek (AMNH). NEBRASKA: Mitchell (CNC); Fromont. COLORADO: White Rock (AMNH); Wray (AMNH); La Junta (AMNH); Pueblo (AMNH); Olney (AMNH); Fort Collins (AMNH). KANSAS: Clark Co. OKLAHOMA: Admore. TEXAS: Forestburg (AMNH); Rosser.



ILLINOIS: Havana. INDIANA: Mineral Springs (CNC). NEW JERSEY: Anglesea.

## 2. 5. 4. Genus Nerax Hull.

Nerax Hull, 1962: 476. Type species: Asilus aestuans L., 1767.

Erax Macquart, 1838. Type species: Erax rufibarbis Macquart, 1838.

Efferia Coquillett, 1893. Type species: Efferia candidus Coquillett 1893.

This group is readily recognized by the form of the male genitalia (Fig. 280) and the ovipositor (Fig. 114), the shape of the third antennal segment and the style (Fig. 141) and the wing venation (Figs. 165-168).

This genus is confined to the New World. In Alberta, Nerax is represented by four species.

### 2. 5. 4. 1. Key to the species of Nerax Hull of Alberta.

1. Third vein of wing branched before tip of discal cell (Figs. 165, 166) ..... 2
  - Third vein branched beyond tip of discal cell (Figs. 167, 168) ..... 3
2. Acrostichal line with long hairs and bristles; last two segments of abdomen of male silvery pollinose, hairs sparse, few in number; abdomen of female yellowish pollinose ..... bicaudatus Hine
  - Acrostichal line without hairs and bristles, but with short setulae; all abdominal segments of male silvery pollinose, hairs numerous, long, except for a longitudinally-directed bare line at middle; abdomen of female silvery white pollinose ..... canus Hine
3. Tibiae black ..... subcupreus Schaeffer
  - Tibiae orange brown ..... costalis Williston





2. 5. 4. 2. Nerax bicaudatus Hine.

Erax bicaudatus Hine, 1919: 138.

Nerax bicaudatus Hull, 1962: 478.

This species is recognized by the wing venation, the pollen pattern of the males and the females, and the presence of comparatively long hairs on the acrostichal line of the mesonotum.

Variation - The color of the bristles varies from entirely white to entirely black in almost every arrangement. In the males, this variation occurs in the ocellar bristles, frontal hairs, few bristles of the mystax, upper occipital bristles, presutural dorsocentral bristles, postalar bristles, mesopleural bristles, and scutellar bristles. In the females, the variation is less obvious.

Ecological notes - This species inhabits arid grassland, pastures, or short grass areas with cacti. It has been found associated with Stenopogon neglectus Bromley and Leptogaster aridus Cole.

Distribution - This species ranges from British Columbia to Manitoba, and south to Texas.

Number of specimens examined - 65.

Localities - ALBERTA: Drumheller (UA); Wardlow (UA); Medicine Hat (UA and CNC); Burdett (UA); Manyberries (UA); Orion (UA and CNC); Comrey, Milk River Valley (UA); Writing-on-Stone Provincial Park (UA); Lethbridge (UA and CNC).

Other localities - BRITISH COLUMBIA: Summerland (UA). MANITOBA: Aweme (CNC). COLORADO: TEXAS: Amarillo; Plainview; Hereford; Coyote Lake, Bailey Co.



2. 5. 4. 3. Nerax canus Hine.

Erax canus Hine, 1916: 22.

Nerax canus Hull, 1962: 478.

This species is similar to bicaudatus in the wing venation (Figs. 165, 166), but is distinguished by other characters: the acrostichal bristle-like hairs are absent, the abdomen is evenly silvery white pollinose in both sexes, and the ocellar bristles are two in number (six in bicaudatus Hine).

Distribution - This species ranges from British Columbia to California. I have not seen Alberta specimens, but Strickland (1946) included this species in his list.

Number of specimens examined - 14.

Localities - BRITISH COLUMBIA: Kamloops (CNC); Seton Lake (CNC); Nicola (CNC); Lone Pine (CNC); Vernon (CNC); Oliver (CNC). CALIFORNIA: Crescent Co. (USNM); Mariposa (USNM); Westgard Pass Plateau (USNM); Midway (USNM); Sierra Nevada (USNM); Antioch (USNM).

2. 5. 4. 4. Nerax subcupreus Schaeffer.

Erax subcupreus Schaeffer, 1916: 66.

Nerax subcupreus Hull, 1962: 478.

This species belongs to the carinatus group (Hine, 1919), in which the acrostichal mane is present, and the costal and the subcostal veins of the wings of the males are slightly bent (Fig. 167).

Distribution - This species ranges from Alberta to Arizona, and from Colorado westward to California.

Number of specimens examined - Holotype (USNM) and nine additional specimens.

Localities - ALBERTA: Medicine Hat (UA and CNC).





Other localities - IDAHO: Victor (AMNH). WYOMING: Stewart R. Sta. (AMNH). COLORADO: Alamosa (AMNH); Electra Lake (AMNH). ARIZONA: Prescott (type locality; USNM). CALIFORNIA: Essex (AMNH).

#### 2. 5. 4. 5. Nerax costalis Williston.

Erax costalis Williston, 1885: 64.

Williston (1885) included this species in his key, but did not describe it. Aldrich (Hine, 1919) and Hull (1962) did not recognize this species, but it is accepted by some other authors.

It is similar to subcupreus Schaeffer, but readily distinguished by its orange brown tibiae.

Distribution - This species ranges from Alberta and Saskatchewan, south to Colorado.

Number of specimens examined - Seven.

Localities - ALBERTA: Medicine Hat (UA); Lethbridge (CNC); Oldman River, Lethbridge (CNC).

Other localities - SASKATCHEWAN: Rockglen (CNC). MONTANA. WYOMING. COLORADO.

#### 2. 5. 5. The Asilus complex.

This complex probably includes several related genera, but no attempt is made to separate them. All of the species involved in this discussion are treated under the name Asilus Linnaeus.

There are 12 species of this complex present in Alberta.



2. 5. 5. 1. Key to the species of the Asilus complex of Alberta.

1. Apical margins of abdominal segments provided with distinct bristles ..... 2
- Apical margins of abdominal segments without bristles ..... 9
2. Femora black, at most only with apical reddish brown or yellow bands ..... 3
- Femora reddish brown or yellow on posterior sides ..... delusus Tucker
3. Posterior margin of eighth sternum of abdomen of the male extended into a sub-triangular lobe, provided with tuft of hairs; ovipositor three to four times as long as sixth and seventh segments together (Figs. 115, 116) .....  
..... occidentalis Hine
- Posterior margin of eighth sternum of abdomen of male not extended; ovipositor at most twice as long as sixth and seventh segments together ..... 4
4. Four scutellar bristles ..... callidus Williston
- Two scutellar bristles, sometimes with additional small ones ..... 5
5. White bristles on postero-ventral side of front tibia ..... 6
- Black bristles on postero-ventral side of front tibia ..... 8
6. Antennal style two-thirds as long as third antennal segment .....  
..... erythocnemius Hine
- Antennal style less than half as long as third antennal segment ..... 7
7. Male genitalia and eighth sternum of abdomen of female orange; penis as in figure 297; black hairs on sternum of abdomen of female ..... mesae Tucker
- Male genitalia and eighth sternum of abdomen of female dark brown; penis as in figure 300; white hairs on eighth sternum of abdomen of female .....  
..... cumbipilosus n. sp.
8. Ventral side of front femur with rather stout black bristles ..... paropus Walker
- Ventral side of front femur with pale long hairs and pile ..... snowi Hine
9. Metanotal slope without pile or hairs ..... auriannulatus Hine
- Metanotal slope with pile or hairs ..... 10





- 10. Posterior sides of femora reddish brown ..... aridalis n. sp.
- Femora uniformly black ..... 11
- 11. Mystax and mesonotal pile black ..... nitidifacies Hine
- Mystax and mesonotal pile white ..... gramalis n. sp.

#### 2. 5. 5. 2. Asilus delusus Tucker

Asilus delusus Tucker, 1907: 92.

This species is readily recognized by the color of the femora: black on the anterior sides, orange on the posterior sides. Another species, aridalis n. sp., has the same color pattern of the legs, but the abdomen is without bristles on the posterior sides. Antennal style slender, as long as third segment (Fig. 142).

Description - Upper side of mystax black, lower side white; bristles on mesonotum and legs mostly black; two black scutellar bristles present; superior forceps of male genitalia twice as long as gonopods (Fig. 282).

Distribution - This species ranges from Alberta southward to Arizona, and from Utah eastward to Kansas.

Number of specimens examined - Seven.

Localities - ALBERTA: Medicine Hat (UA and CNC); Lethbridge (UA).

Other localities - MONTANA. UTAH: Glacier Lake (USNM). COLORADO. KANSAS. ARIZONA: Santa Rita Mts. (USNM); Chiricahua Mts. (USNM).

#### 2. 5. 5. 3. Asilus occidentalis Hine.

Asilus occidentalis Hine, 1909: 147-148.



This species is readily recognized by the presence of a lobe-like extension on the posterior margin of the eighth sternum of the abdomen of the male (Figs. 115, 116), and the ovipositor is three to four times as long as the sixth and seventh abdominal segments together.

**Distribution** - This species ranges from British Columbia to California, and the presence of this species in Alberta is doubted. Strickland (1938) might have based his record on a misidentified specimen of Asilus callidus Williston.

**Number of specimens examined** - Six.

**Localities** - BRITISH COLUMBIA: Royal Oak (CNC); Aspen Grove (CNC); Nicola Lake, Merritt (UA); Keremeos (UA); Victoria (CNC). OREGON: Antelope Mt., Harney Co. (UA). CALIFORNIA. NEVADA.

#### 2. 5. 5. 4. Asilus paropus Walker.

Asilus paropus Walker, 1849: 455.

This species is similar to callidus Williston and erythrocnemius Hine. It is distinguished from callidus Williston by the number of the bristles present on the scutellar margin (Figs. 71, 72), and from erythrocnemius Hine by the size of the antennal style (Figs. 143, 144). This species also resembles snowi Hine, but is distinguished by the presence of stout bristles on the ventral side of the front femur, instead of hairs and pile (Figs. 82, 83).

**Distribution** - This species ranges from Alberta to New Mexico, and eastward to New Hampshire and Connecticut.

**Number of specimens examined** - 64.

**Localities** - ALBERTA: Bilby (UA); Golden Spike (UA); Devon (UA); Cypress Hills (UA); Calgary (CNC).

**Other localities** - SASKATCHEWAN: Saskatoon (CNC); Skipton (CNC). MANITOBA: Teulon (CNC); Melita (CNC). ONTARIO: Ottawa (CNC). QUEBEC: Hull





(CNC); Aylmer (CNC). NOVA SCOTIA: Digby Co. (CNC). Truro (CNC). NORTH DAKOTA. WYOMING. UTAH. CALIFORNIA. NEW MEXICO.

2. 5. 5. 5. Asilus callidus Williston.

Asilus callidus Williston, 1893: 75.

This species can be easily mistaken for occidentalis Hine, but can be distinguished by the absence of a lobe-like projection from the eighth sternum of the abdomen of the male; the female has a comparatively short ovipositor. The male genitalia of the two species are slightly different from one another (Figs. 283-286).

Ecological notes - This species inhabits an open space near or inside coniferous forests. In Alberta, this species has been found in numbers together with Stenopogon inquinatus Loew.

Distribution - This species ranges from British Columbia to Massachusetts, southward to California and Utah. In Alberta it is not found in the prairies. It is probably a boreal and subalpine species.

Number of specimens examined - 169.

Localities - ALBERTA: Lac la Biche (UA); Opal (UA); Tawatinaw (UA); Bilby (UA); Golden Spike (UA); Jasper, Lake Celestine (UA); Gorge Creek (UA); Flat Creek (UA); Banff (CNC); Banff, Lake Minnewanka, Davil's Gap Trail (UA); Nordegg (UA); Seebe (DE); Cowley (CNC); Coleman, Lake Island (CNC); Waterton Lakes (CNC).

Other localities - BRITISH COLUMBIA. WASHINGTON. OREGON. CALIFORNIA: Colville, Rock Creek (CNC); Coalinga (CNC); Carson Pass (CNC); Lone Pine (CNC). NEVADA: Ormsby Co. (USNM). UTAH: Zion Nat'l Park (USNM). MASSACHUSETTS: Springfield (USNM).



2. 5. 5. 6. Asilus erythocnemius Hine.

Asilus erythocnemius Hine, 1909: 163.

This species resembles callidus Williston, but it is paler, yellowish pollinose, and it has only two scutellar bristles. It is distinguished from other species by the length of the antennal style (Fig. 144).

Variation - The pollinose excrescence of a number of specimens is bright golden yellow instead of yellowish, and the mesonotal vittae are clearly defined blackish brown. All other characters are the same.

Ecological notes - This species is found in an open grassland or in the open spaces within the parkland or coniferous forests.

Distribution - This species ranges from British Columbia to Wyoming, and east to Massachusetts and Maryland.

Number of specimens examined - 126.

Localities - ALBERTA: Peace River (UA); Lac la Biche (UA); Edmonton (UA and LMK); Consort (UA); Rosebud (UA); Cassils (UA); Oyen (UA); Medicine Hat (UA); Orion (UA); Manyberries (UA); Burdett (UA); Lake Newell, Kinbrook Island Provincial Park (UA); Scandia (UA); Cypress Hills (UA); Lethbridge (UA); Seebe (UA); Waterton (UA).

Other localities - BRITISH COLUMBIA: Trinity Valley (CNC); Prince George (CNC). QUEBEC: Natashqua (CNC). MASSACHUSETTS. MARYLAND. MONTANA. WYOMING.

2. 5. 5. 7. Asilus snowi Hine.

Asilus snowi Hine, 1909: 160.

This species is similar to paropus Walker, but the ventral side of the front femur is provided with hairs and pile only, and is without bristles.





Distribution - This species occurs mainly in eastern central North America, from South Dakota to Kansas, eastward to Nova Scotia, and south to Virginia. The presence of this species in Alberta is doubted, but Strickland (1938) listed it, possibly on the basis of misidentified specimens.

Number of specimens examined - 13.

Localities - ONTARIO: Ottawa (UA). QUEBEC: Hemmingford (CNC). NOVA SCOTIA: Truro (CNC). CONNECTICUT: Cornwall; Hamden; Stratford; Marlborough; Wallington; Stamford. DISTRICT OF COLUMBIA: Little Falls (USNM). VIRGINIA: Great Falls (USNM). ILLINOIS: Fort Sheridan (UA).

#### 2. 5. 5. 8. Asilus nitidifacies Hine.

Asilus nitidifacies Hine, 1909: 165.

This species is recognized by the black mesonotal pile, and also by the shape of the superior forceps of the male genitalia (Fig. 288). The wings are evenly covered with microtrichiae, and brownish markings are absent on the middle of the subcostal cell (Fig. 169).

Ecological notes - This species is mostly found on the edges or in the open spaces of coniferous forests.

Distribution - This species ranges from British Columbia to Oregon, eastward to Quebec.

Number of specimens examined - 19.

Localities - ALBERTA: Cross Lake Trail (UA); Flatbush (UA); Opal (UA); Banff (UA); Flat Creek (UA); Maraine Lake (CNC).

Other localities - BRITISH COLUMBIA: Terrace (USNM); Ainsworth (USNM). OREGON: Mt. Hood (USNM). ONTARIO: Larder Lake (CNC). QUEBEC: Seven Isles (CNC).



2. 5. 5. 9. Asilus auriannulatus Hine.

Asilus auriannulatus Hine. 1906: 29.

This species is easily recognized by the color pattern of the legs. The legs are mostly orange yellow, but the coxae are black, the front and the middle femora are black on the anterior basal two-thirds. The male genitalia are easily distinguished from those of the other species (Figs. 291-294).

Distribution - This species ranges from Alberta, British Columbia, south to California.

Number of specimens examined - 21.

Localities - ALBERTA: Seebe (DE); Banff (UA and CNC); Gorge Creek (UA); Waterton (CNC).

Other localities - BRITISH COLUMBIA: Fernie (CNC); Mara (CNC). OREGON: Prineville, Hood River (USNM). CALIFORNIA. WYOMING.

2. 5. 5. 10. Asilus mesae Tucker.

Asilus mesae Tucker, 1907: 92.

This species is easily recognized by the orange color of the male genitalia and of the eighth sternum of the abdomen of the females. This species is similar to erythrocnemius Hine, but can be distinguished by the size of the antennal style: less than half of the third antennal segment in mesae Tucker, and more than two thirds in the latter. It is also similar to cumbipilosus new species. For details, see under cumbipilosus.

Ecological notes - In Alberta, this species inhabits the grasslands of the prairie.

Distribution - This species ranges from British Columbia and Alberta, southward to Colorado.

Number of specimens examined - 23.

Localities - ALBERTA: Drumheller (UA); Lake Newell, Kinbrook Island Provincial





Park (UA); Medicine Hat (UA); Manyberries (UA); Taber (CNC).

Other localities - BRITISH COLUMBIA: Oliver (CNC). IDAHO: Bear Lake (CNC); Paris (CNC); Mt. Pelier (CNC). WYOMING: Green River (CNC); Rock Spring (CNC); Rawlins (CNC); Carbon Co. (CNC). UTAH: Benson (CNC); Snowville (CNC). COLORADO: Pagosa Spring (CNC); Regnier (CNC); White Rock (CNC); Walsenburg (CNC); Grand Junction (CNC); Animas (CNC). KANSAS.

#### 2. 5. 5. 11. Asilus cumbipilosus new species.

This species is markedly similar to mesae Tucker, and is distinguished by differences in the male genitalia and the ovipositor. The other characters are more or less similar in both species. These two species occurs in the same habitats.

Description - Other characters, except male genitalia and ovipositor, similar to those of mesae Tucker; male genitalia dark brown; penis with short arms, as long as penis sheath (Fig. 300); ovipositor dark brown, eighth sternum of abdomen of female with white hairs.

The name cumbipilosus has been chosen, because of the appressed hairs present on the legs.

Ecological notes - This species is an inhabitant of short grass prairie.

Holotype: Male, Etzikom Coulee, Alberta, 3.VIII.1963 (J.+C. Sharplin and S. Adisoemarto); deposited in CNC.

Paratypes: three females, same data as for holotype; one female, Welling, Alberta, 19.VII.1922 (H. L. Seamans); one male Medicine Hat, Alberta, 8.VII.1932 (F. S. Carr); one female, Orion, Alberta, 9.VII.1950 (E. H. Strickland); two males, two females, Kinbrook Island Provincial Park, Lake Newell, Alberta, 10.VI.1964



(S. Adisoemarto); all are deposited in UA.

2. 5. 5. 12. Asilus aridalis new species.

This species is more or less easily recognized by the greyish pollinose body, and distinguished from mesae Tucker and cumbipilosus new species by the absence of the bristles from the posterior sides of the abdominal segments and the color pattern of the femora.

Description - Male. Head yellowish grey pollinose; gibbosity from about the middle of face; mystax white with few black hairs on top; antennae black, first segment one and one half times as long as second, third segment attenuate apically, as long as first two together; style about two-thirds as long as third antennal segment (Fig. 145); frontal hairs white; ocellar hairs black; occipital bristles mostly white, mixed with few black on upper side; beard and pile on lower side of proboscis white; palpi black, long, one-segmented, white haired; proboscis black.

Thorax yellowish grey pollinose; pile white; hairs on postsutural dorsocentral area, on scutellum, and on metanotal slope, white; mesonotal setulae white, black on acrostichal line; mesonotal bristles black, two presuturals, two intraalars, one postalar, and five dorsocentrals; two scutellars black; metapleural bristles white.

Legs with coxae greyish pollinose; pile and hairs on front and middle coxae white; anterior sides of femora black, posterior sides reddish yellow, provided with appressed, short, white setulae, and long white hairs also present on ventral sides; tibiae orange yellow, black on tips, with appressed, short, white setulae and golden tomentum on antero-ventral sides of front pair and on posterior sides of hind pair; tarsi orange yellow, black haired, tomentum present as continuation from tibiae; claws black; empodia as long as claws, black; femoral bristles white, tibial bristles mostly black; tarsal bristles entirely black.

Wings hyaline, microtrichiae light brownish; halteres greyish yellow, black





tinged.

Abdomen greyish pollinose, brownish markings on mid-dorsum of each segment; hairs white, on first segment erect, appressed on the remaining; white bristles present on sides of first segment; male genitalia reddish brown (Figs. 301-303).

Female - Most characters, similar to those of male, different in the followings: mystax mostly black, white bristles only on epistomal margin; hairs on first two antennal segments black, few white on dorsal sides; frontal hairs black; mesonotal setulae entirely black; bristles on legs mostly black; dorsal abdominal hairs black; ovipositor black, twice as long as seventh abdominal segment, black haired.

This species is called aridalis, because the specimens live in the arid areas.

Ecological notes - The habitat of this species is similar to that of cumbipilosus new species.

Holotype: Male, Dinosaur Park, Steveville, Alberta, 9.VI.1964 (S. Adisoemarto); deposited in CNC.

Allotype: Female, same data as for holotype; deposited in CNC.

Paratypes: one male, two females, same data as for holotype (CNC); male, female, Kinbrook Provincial Park, Lake Newell, Alberta, 10.VI.1964 (S. Adisoemarto) (CNC); two males, female, Scandia, Alberta, 20.VI.1956 (E. E. Sterns) (CNC); female, Medicine Hat, Alberta, 16.VII.1956 (E. E. Sterns) (CNC); male, Lethbridge, Alberta, 4.VII.1956 (H. E. Grey) (CNC); female, Lethbridge, 6.VII.1956 (E. E. Sterns) (CNC); male, female, Lethbridge, 7.VII.1956 (E. E. Sterns) (CNC).

## 2. 5. 5. 13. Asilus gramalis new species.

This species is similar to mesae Tucker and cumbipilosus new species, but is readily distinguished by the absence of the bristles from the posterior sides of the abdominal segments. It is distinguished from aridalis new species by the golden pollinose body and entirely black femora. Total length ranges from 9.0 mm to 13.0 mm.



Description - Face, front, and vertex golden yellow pollinose; gibbosity from about the middle of face; mystax mostly white, three black bristles present on top and few on lower corners; antennae black, first two segments black haired, third segment tapers apically, one and a half times as long as first two together; style one-third as long as third antennal segment (Fig. 146); frontal hairs white; ocellar hairs black; occipital bristles entirely white; beard white, pile on lower side of proboscis white; palpi black, long, one-segmented, black haired; proboscis black.

Thorax golden yellow pollinose, pile, hairs, and bristles mostly white; hairs on mesonotum not setula-like, more or less erect; black hairs present on space between humeri and dorsocentral area; mesonotal bristles white, two presuturals (three on left side), two intraalars; two postalars, and six dorsocentrals (eight on right side), mostly black; two scutellars black; metapleural bristles white.

Coxae golden yellow pollinose, anterior pairs with white pile and bristles; femora black, reddish brown streaks present on ventro-posterior sides, with appressed, short, white setulae, and a row of white bristles on ventral sides; tibiae reddish brown, black on tips, with appressed, short, white setulae, and golden tomentum on antero-ventral sides of front pair, and on posterior sides of hind pair, bristles white; tarsi reddish brown, white haired, tomentum present as continuation from tibiae, bristles mixed black and white; claws black, empodia orange yellow.

Wings hyaline, microtrichiae brownish; halteres slightly brownish yellow.

Abdomen greyish yellow pollinose; hairs white, appressed; bristles white, present only on sides of first segment; male genitalia reddish brown; superior forceps one and a half times as long as gonopods (Fig. 304-306); hairs white.

Female - similar to male; ovipositor black, one and a half times as long as seventh segment, black haired.

This species has been named gramalis, because the specimens of this species live in grass fields.





Ecological notes - The habitat of this species is similar to that of aridalis and cumbipilosus.

Holotype: Male, Scandia, Bow River, Alberta, 10.VI.1964 (S. Adisoemarto), in copula with allotype; deposited in CNC.

Paratypes: four males, same data as for holotype; five males, six females, Little Bow Park, Lake McGregor, Alberta, 11.VI.1964 (S. Adisoemarto); male, female, Kinbrook Island Park, Lake Newell, Alberta, 10.VI.1964 (S. Adisoemarto); all in UA; female, one broken specimen, Cameron Lake, Waterton Nat'l Park, Alberta, 17.VI.1956 (E. E. Sterns) (CNC).

## 2. 5. 6. Genus Negasilus Curran

Negasilus Curran, 1934: 184.

This genus is distinguished from the Asilus complex by the absence of the scutellar bristles. The other characters are not different from those of the Asilus complex.

The genus is monotypic.

### 2. 5. 6. 1. Negasilus belli Curran

Negasilus belli Curran, 1934: 184.

This species is similar to Asilus cumbipilosus new species, but is easily distinguished by the absence of the scutellar bristles and the bristles on the posterior margins of the abdominal segments. The genitalia of these two species are different from one another.

Variation - A female specimen from Lethbridge, Alberta differs slightly from the others in the following respects: occipital bristles black, frontal hairs black, body with golden yellow pollen, brighter than in the other specimens; kept in CNC.

Distribution - This species ranges from Alberta to Colorado, and west to



California.

Number of specimens examined - 25.

Localities - ALBERTA: Consort (CNC); Claresholm (CNC); Bow Island (CNC); Cypress Hills (UA); Scandia (CNC); Taber (CNC); Lethbridge (CNC).

Other localities - SASKATCHEWAN: Assiniboia (CNC). WYOMING: Laramie (USNM). COLORADO: Creede (USNM). UTAH: Laketown (USNM); Manila (USNM). NEVADA: Fallon (AMNH). CALIFORNIA: Cedarville (USNM); Lake Mono Co. (AMNH).





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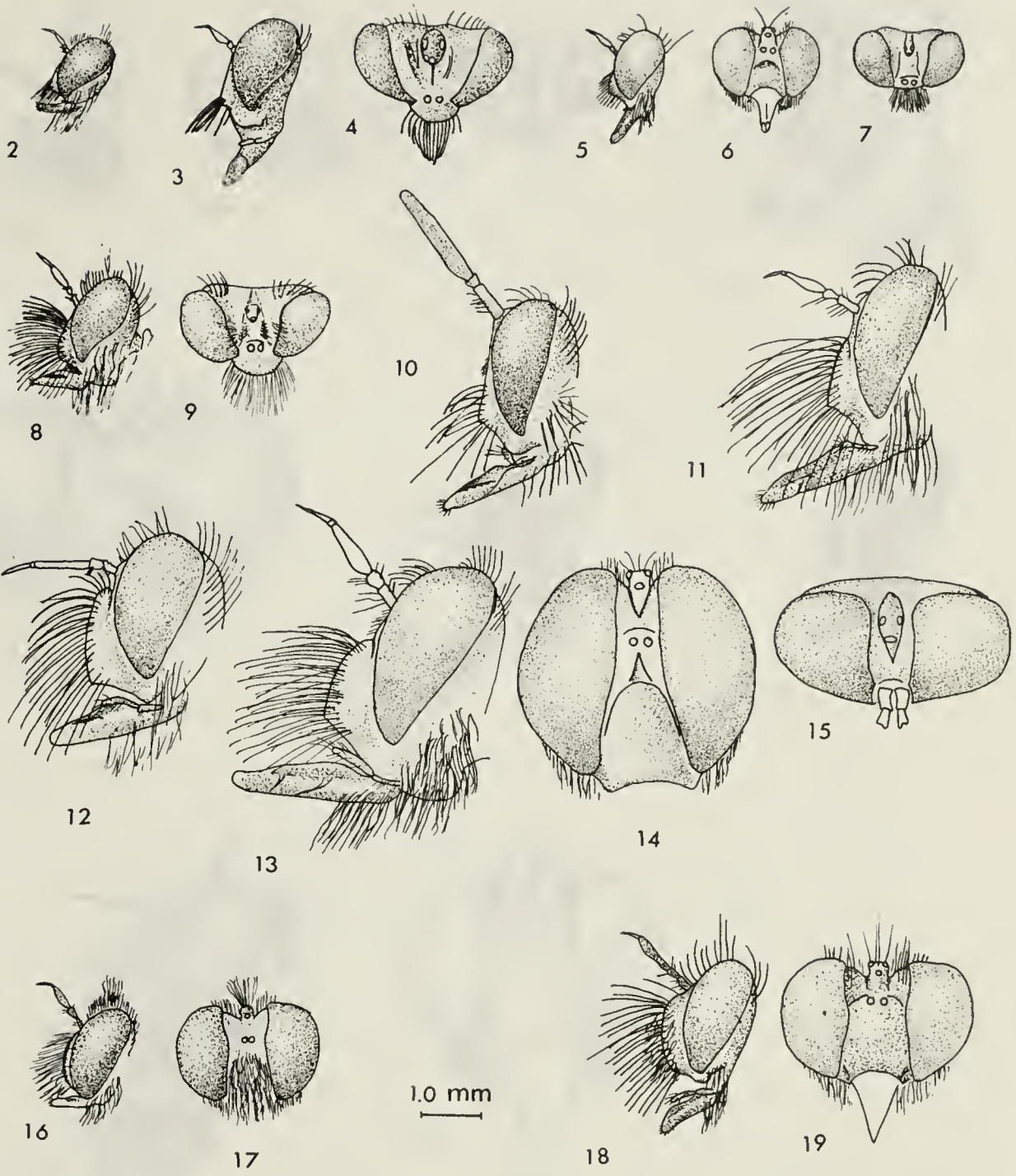
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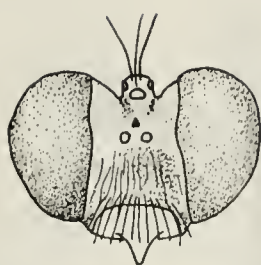




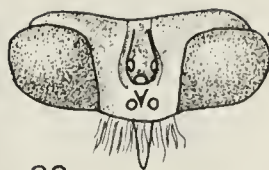




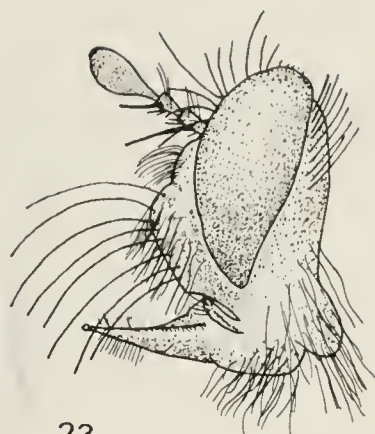
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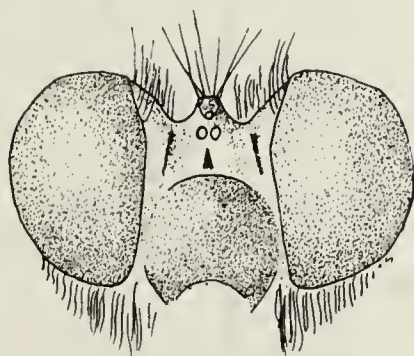
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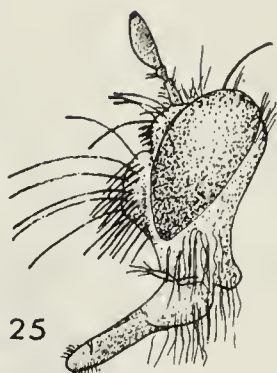
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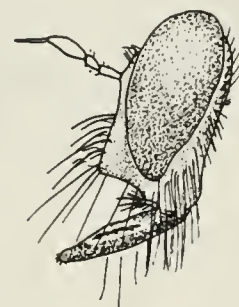
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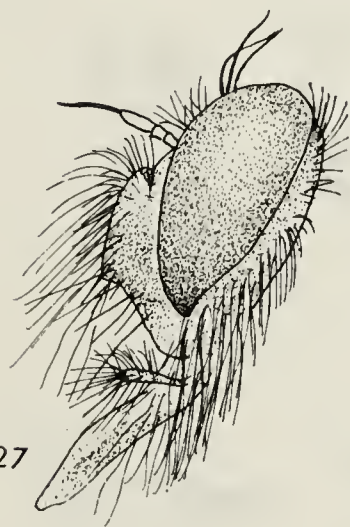
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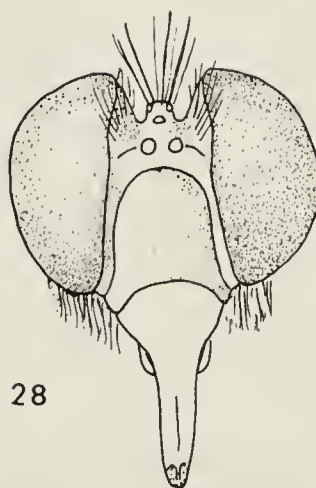
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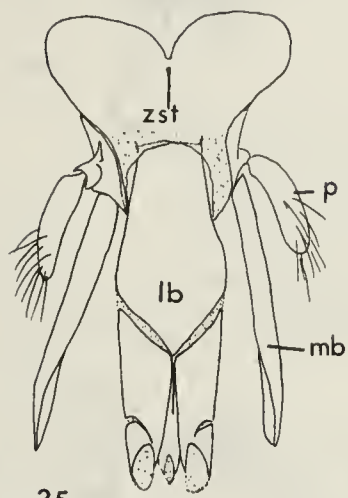
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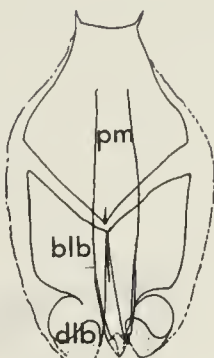
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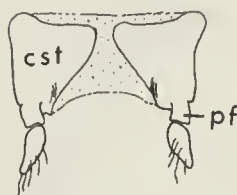
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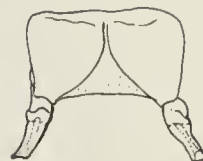
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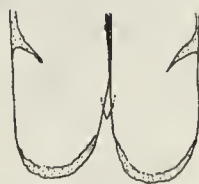
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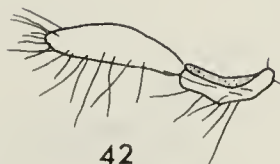
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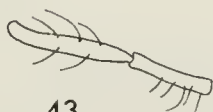
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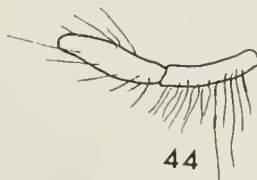
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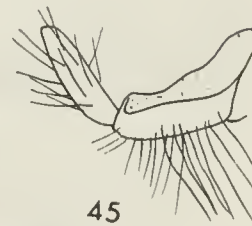
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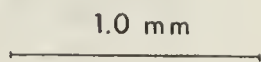
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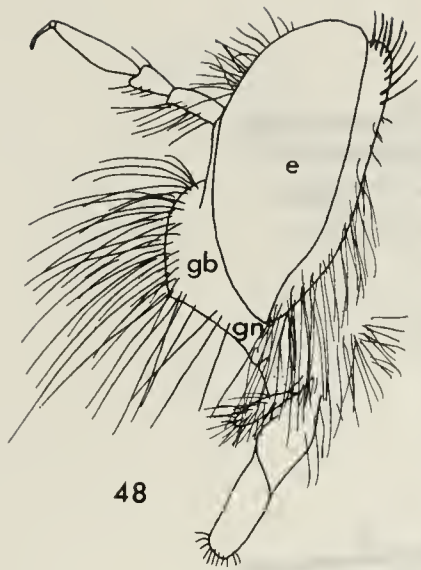


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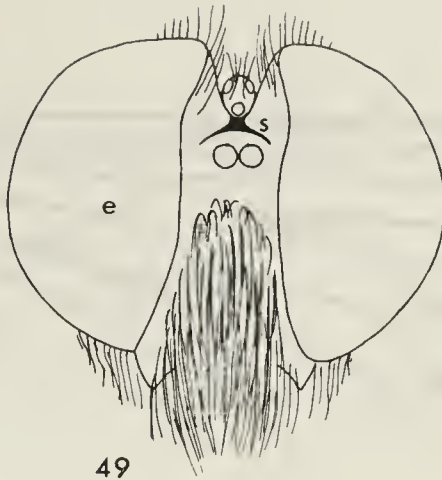


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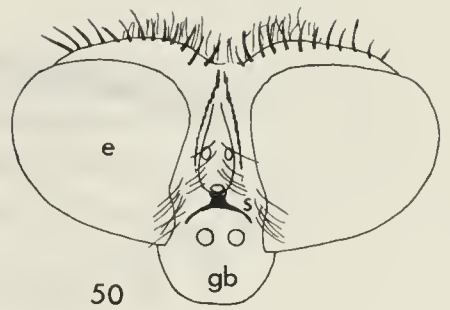




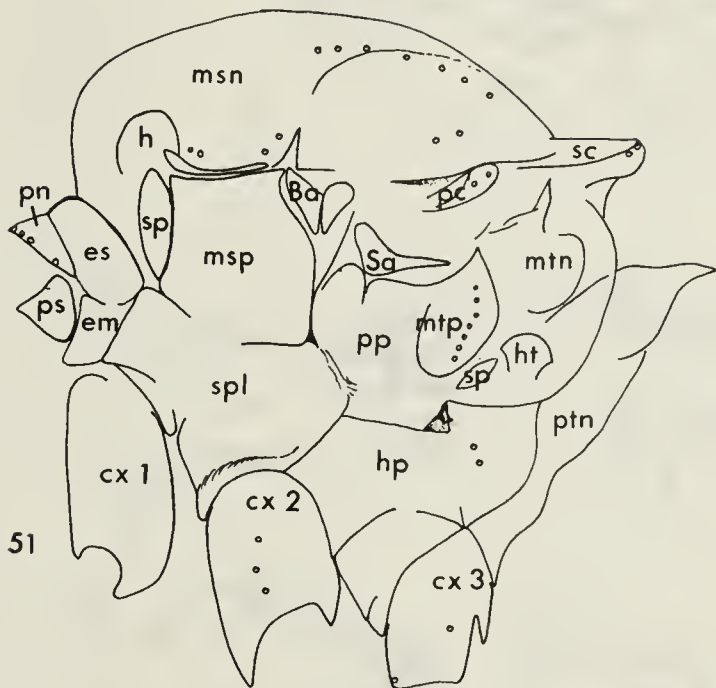
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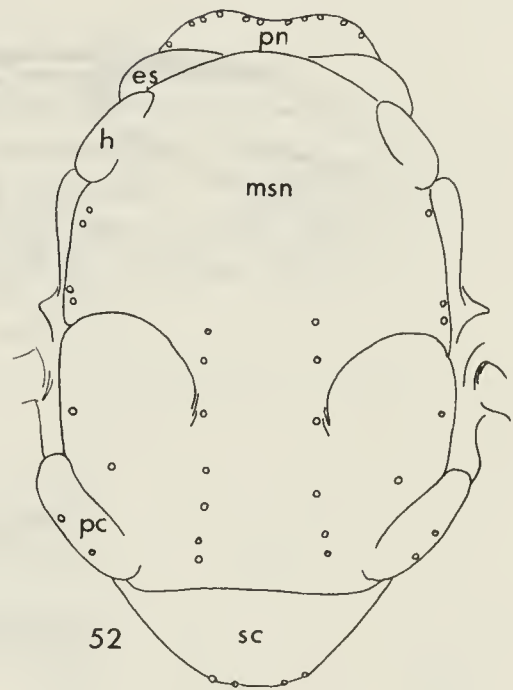
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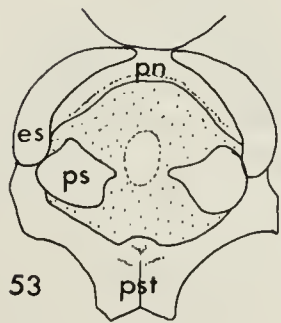


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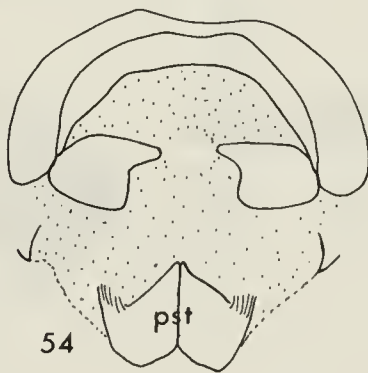
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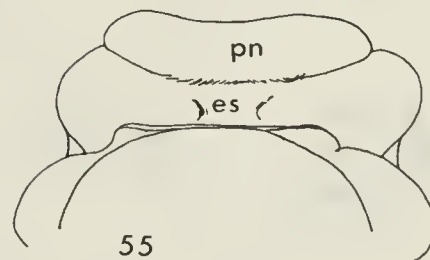
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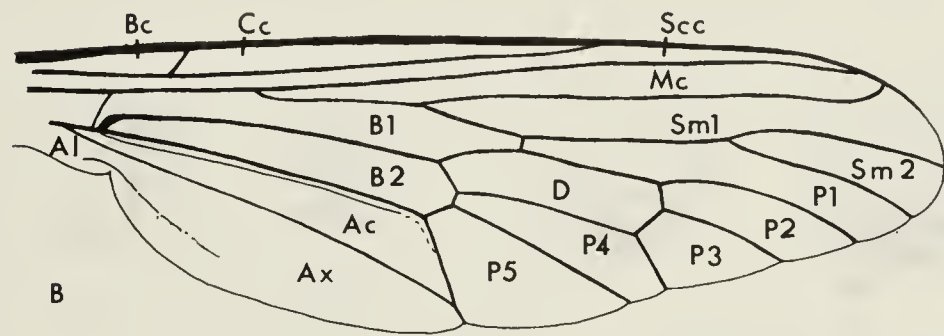
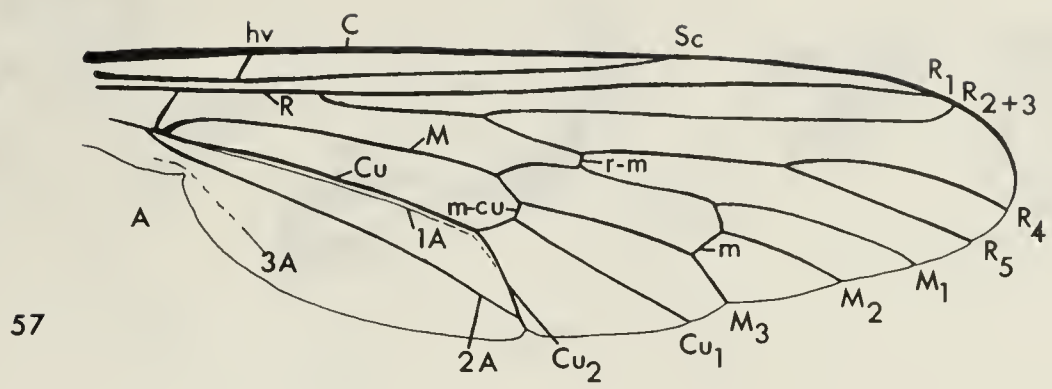
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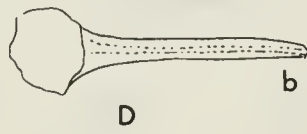
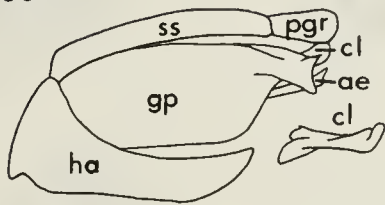
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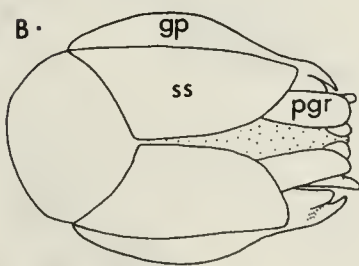


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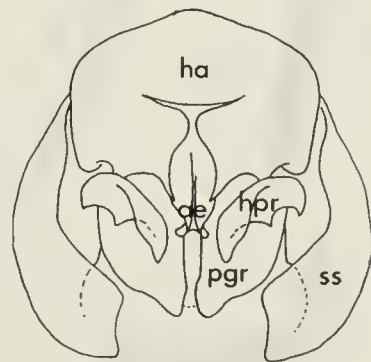


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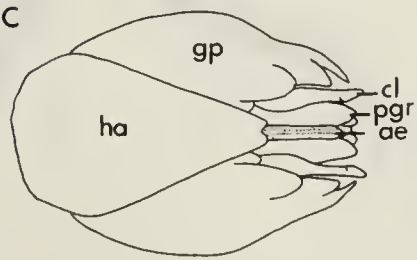


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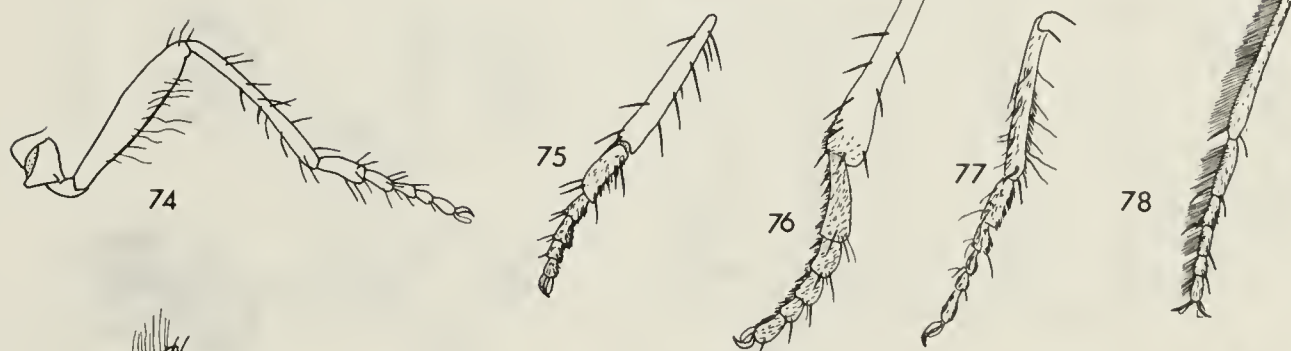
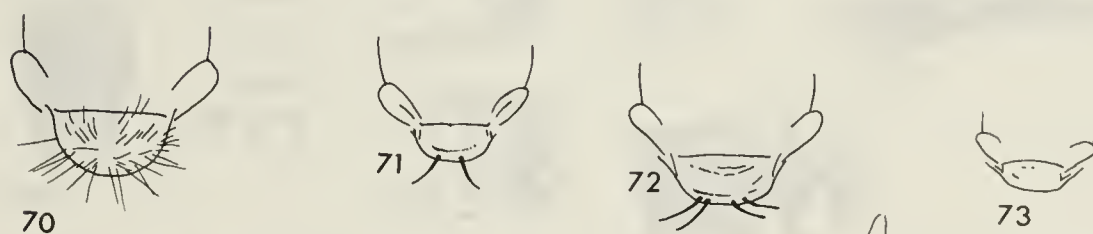


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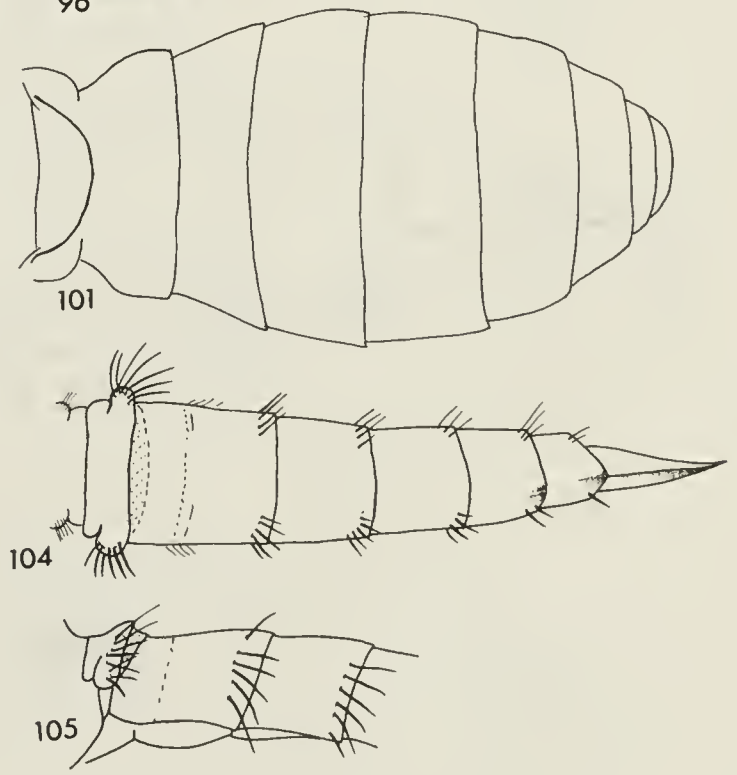
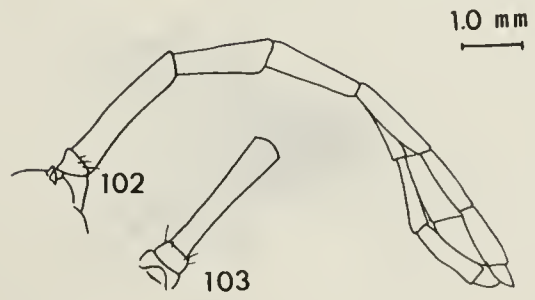
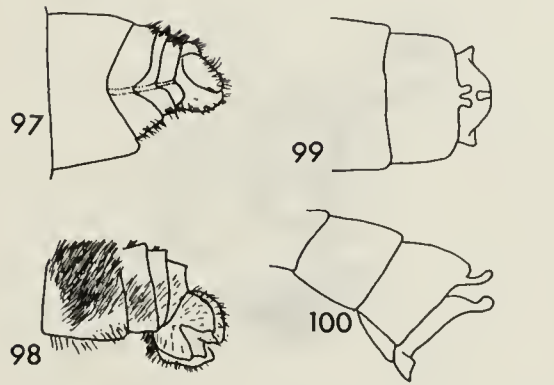
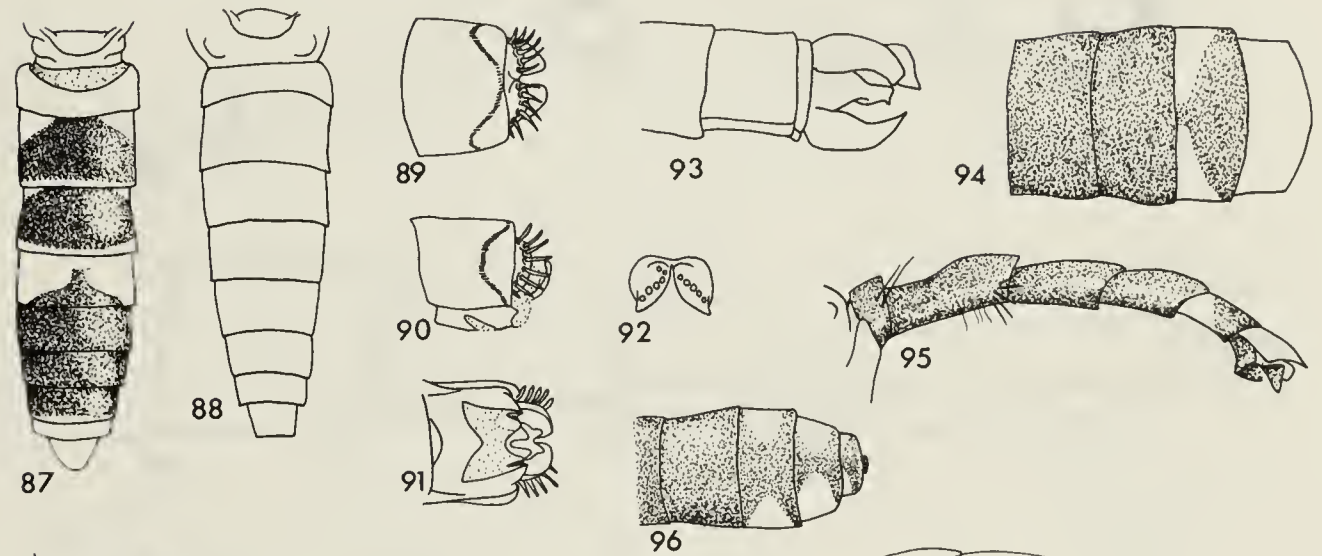
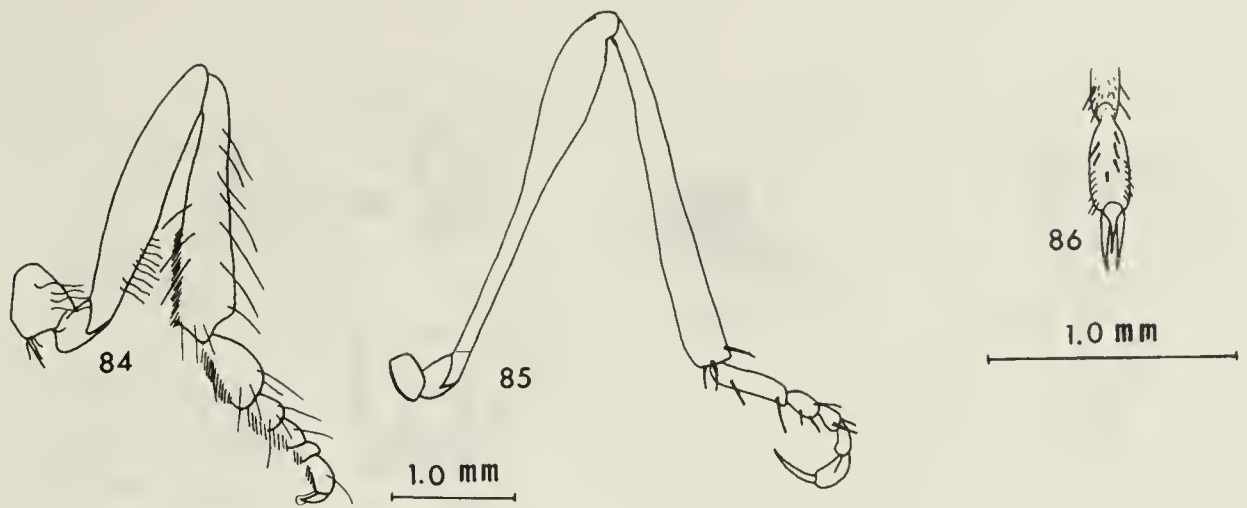
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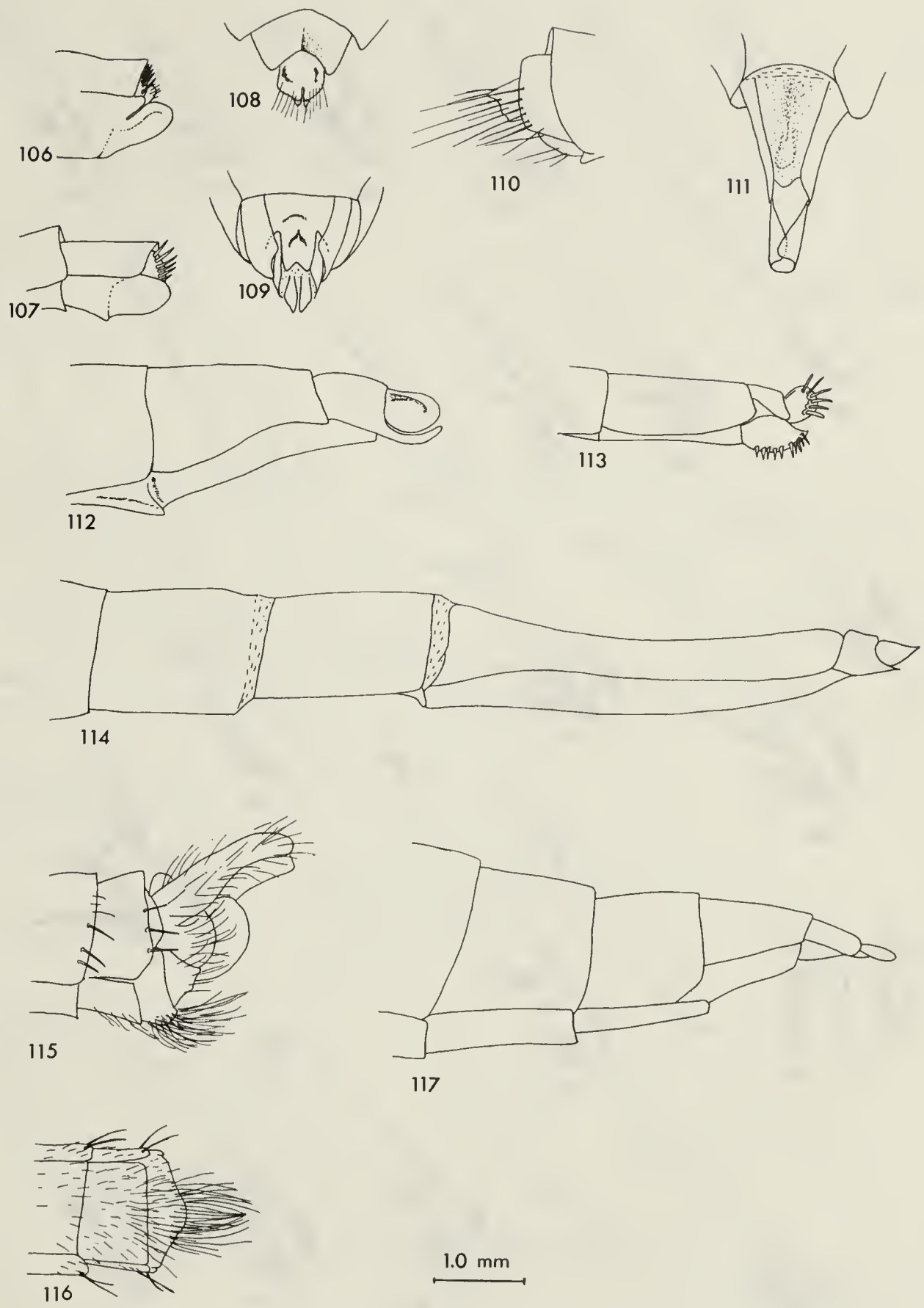
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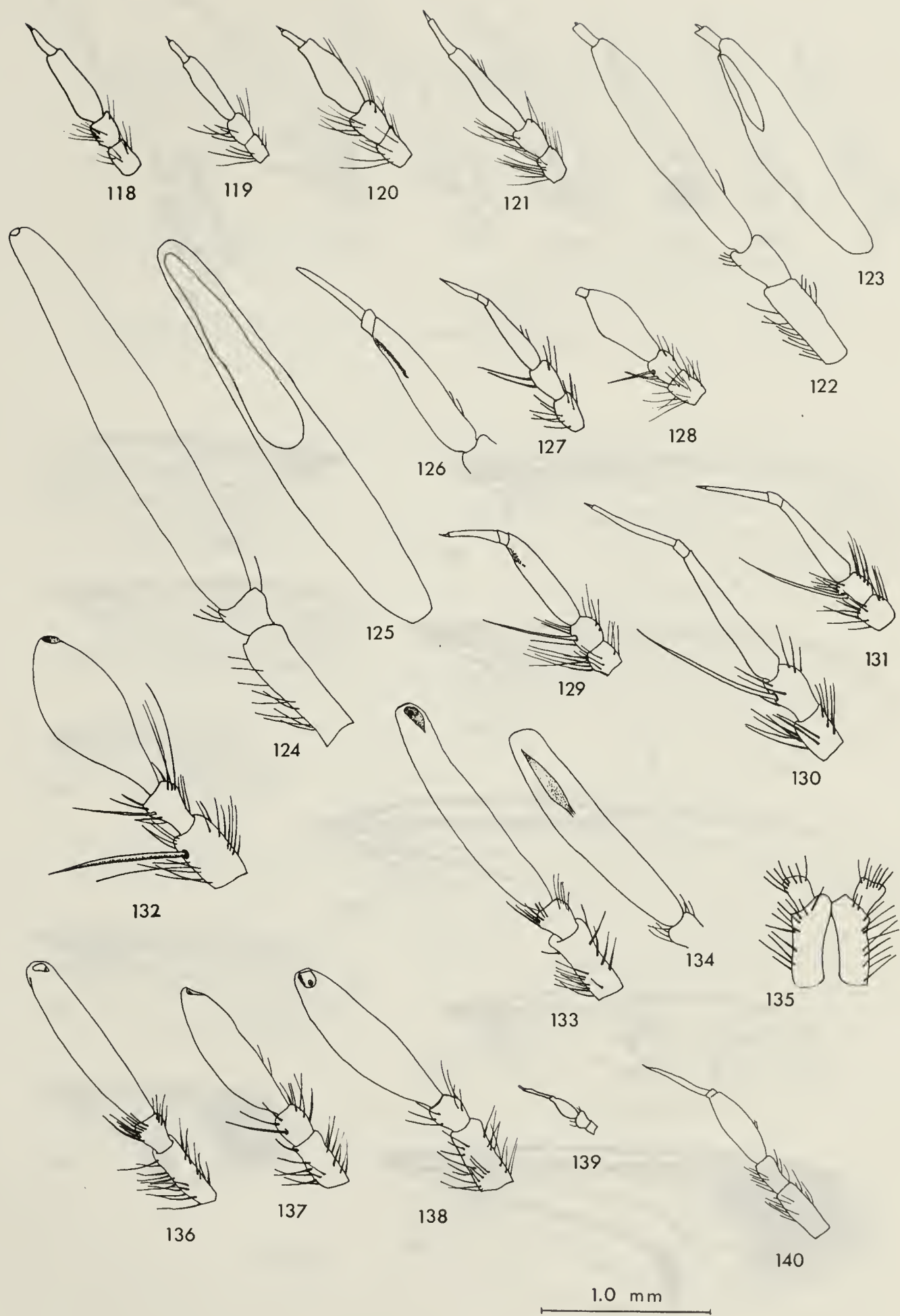




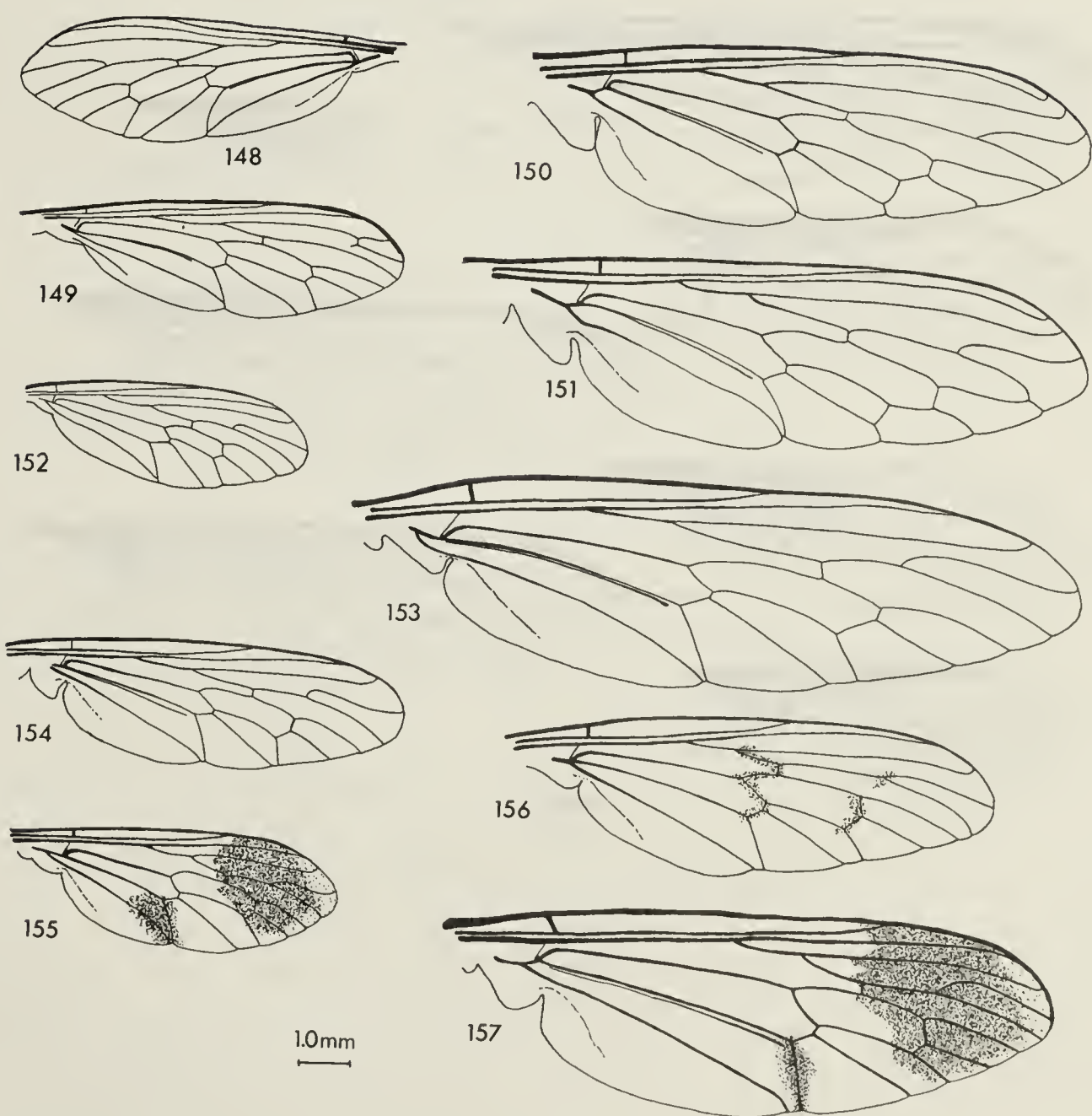
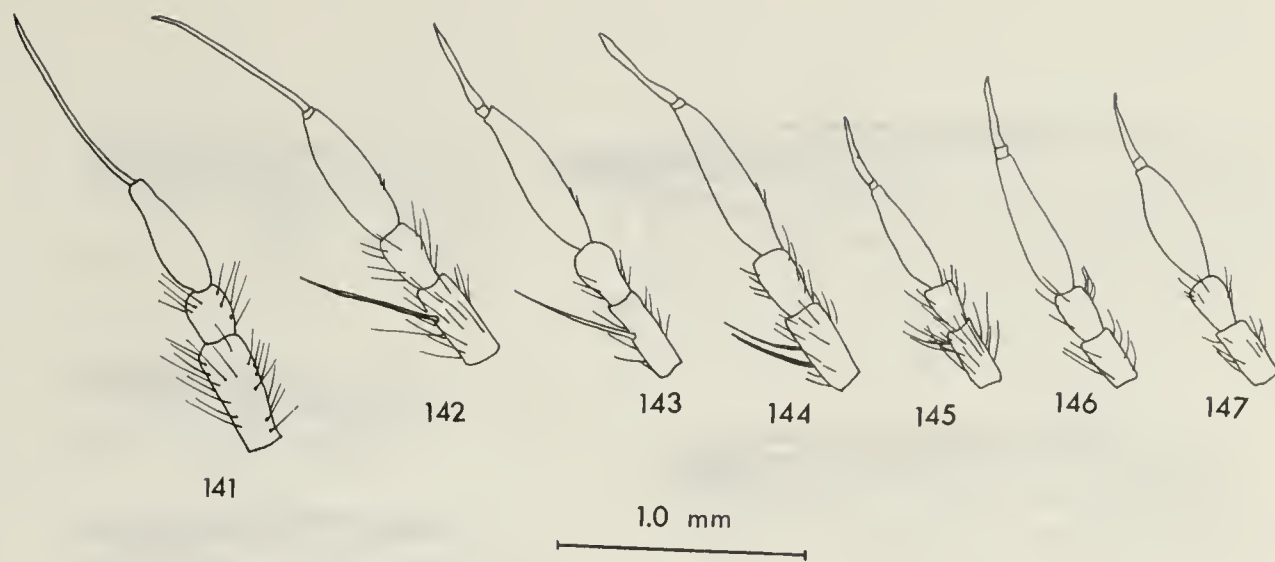






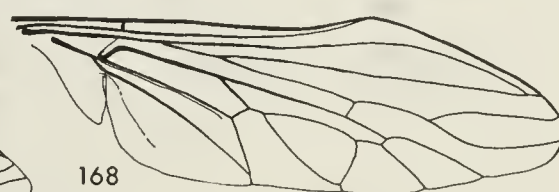
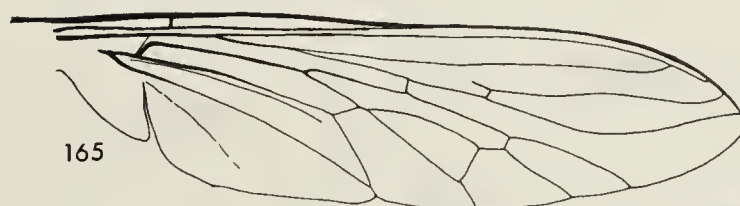
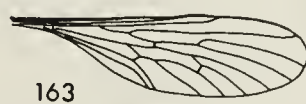
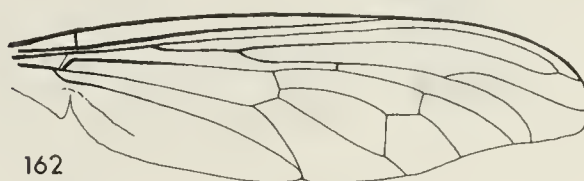






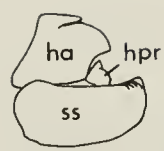






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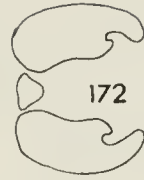




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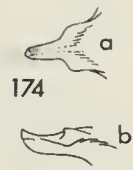
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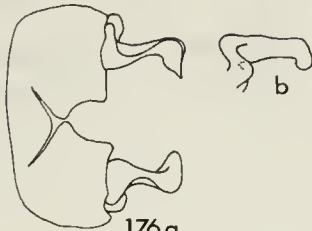
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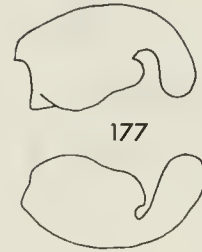
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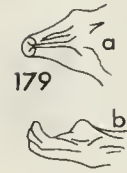
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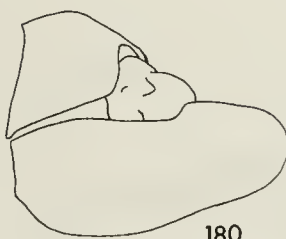
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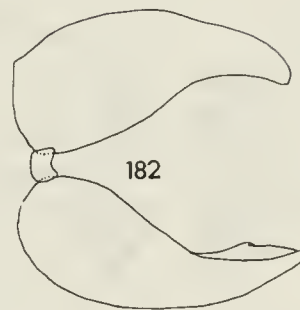
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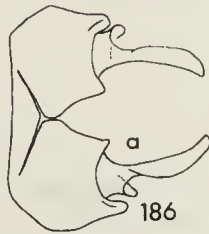
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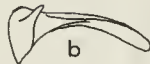
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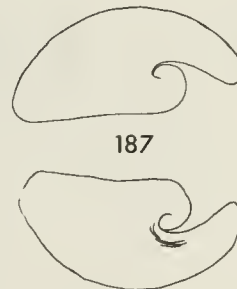
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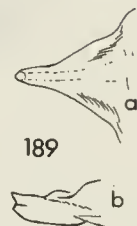
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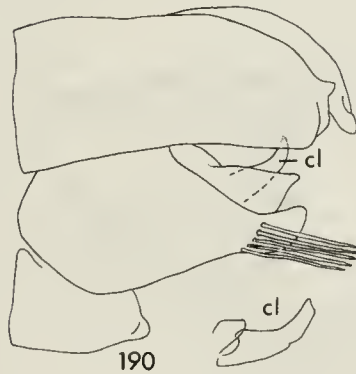
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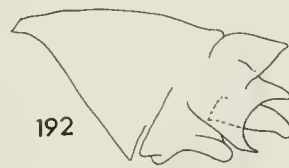
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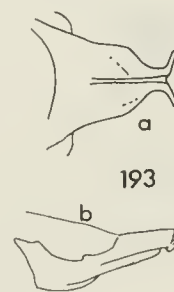
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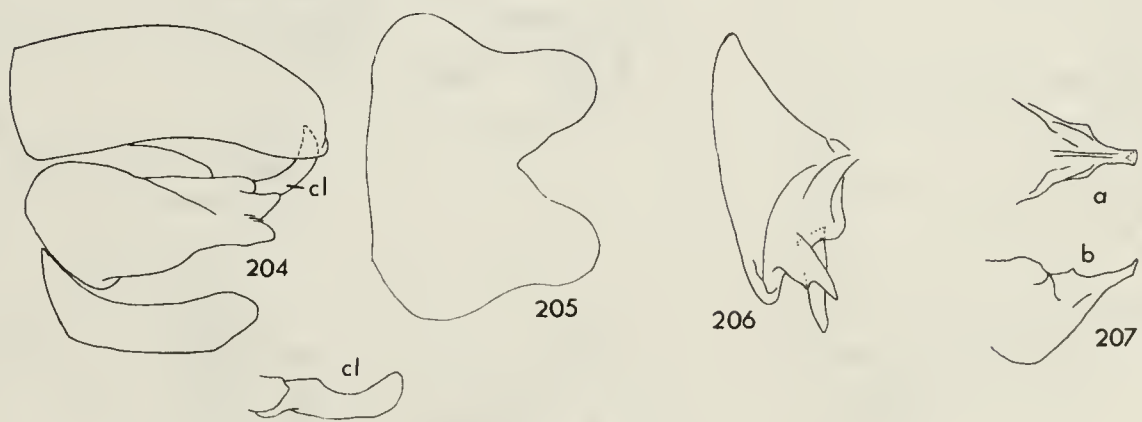
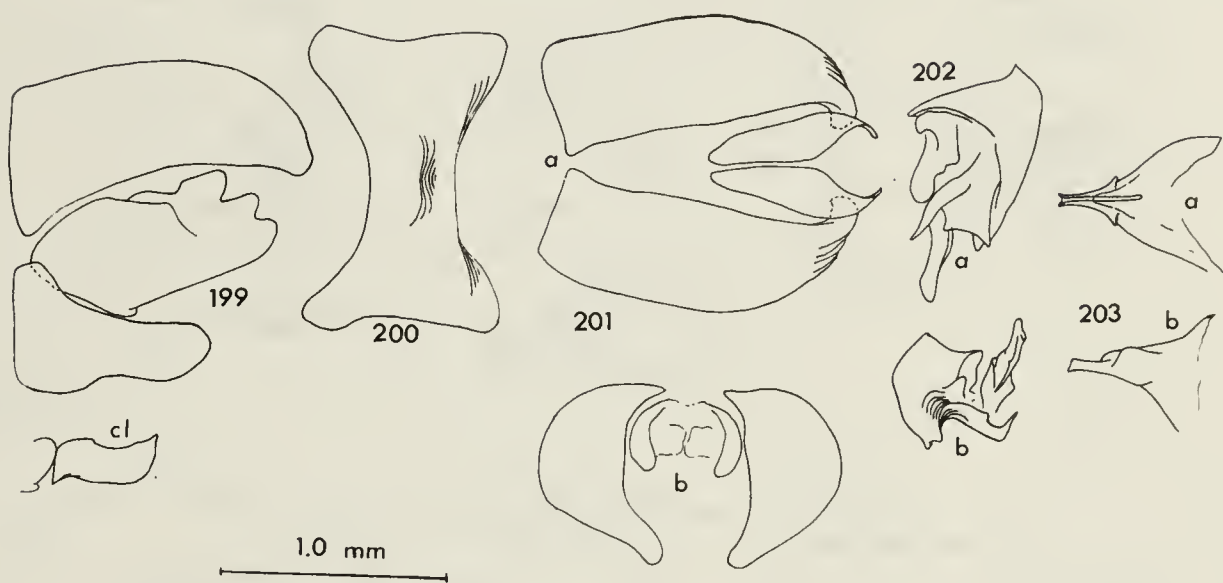
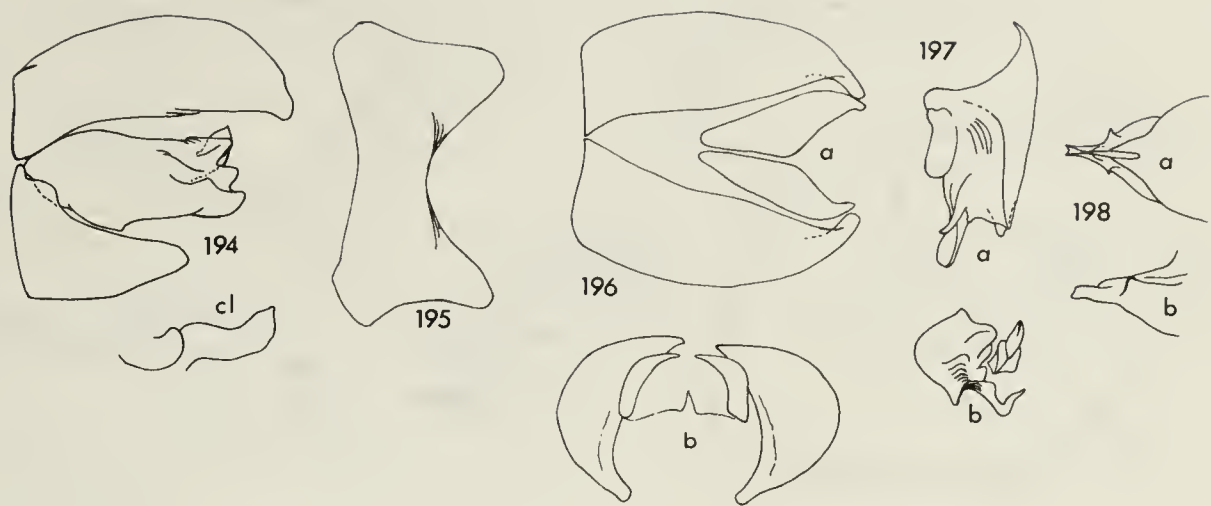


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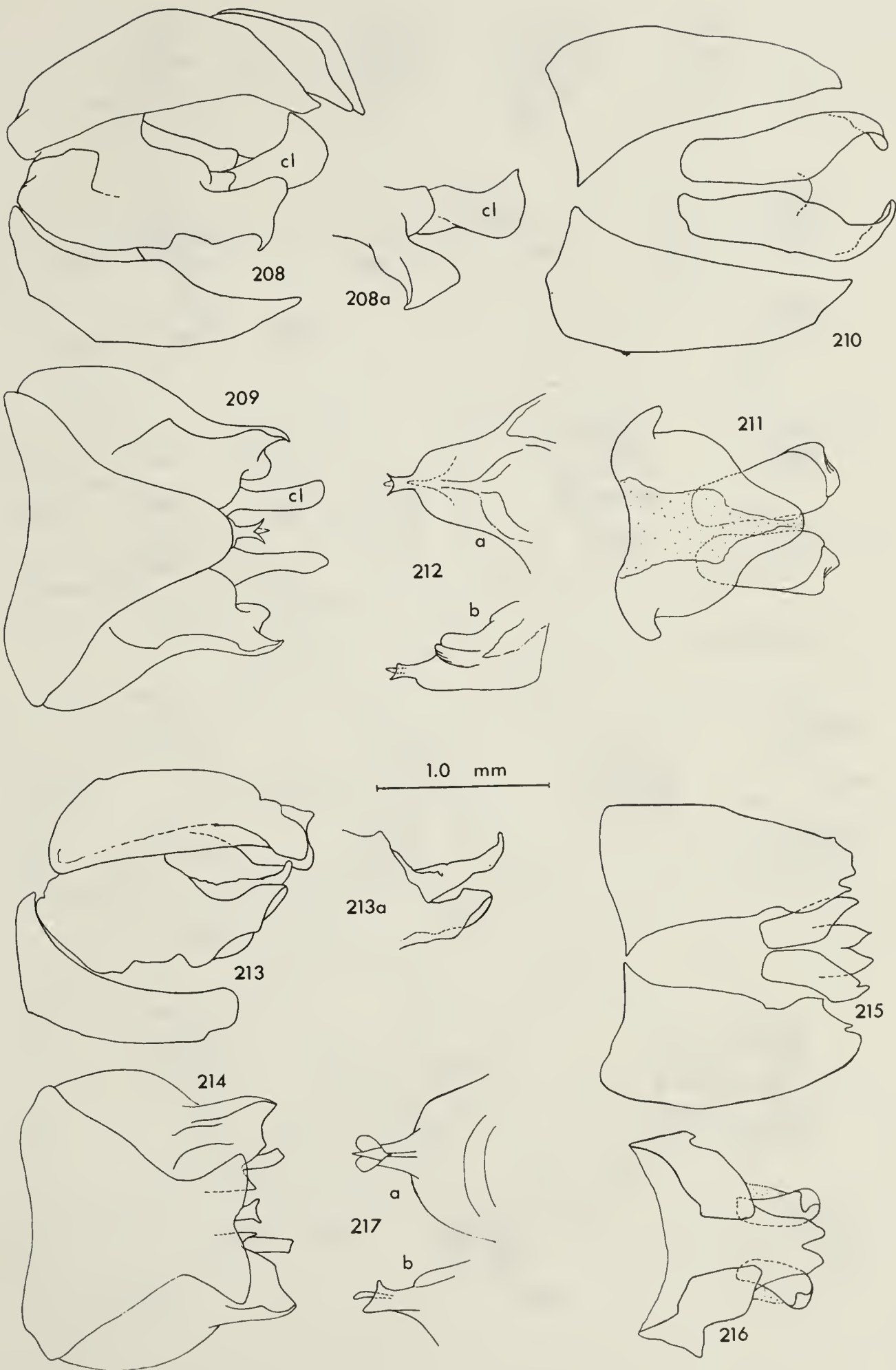
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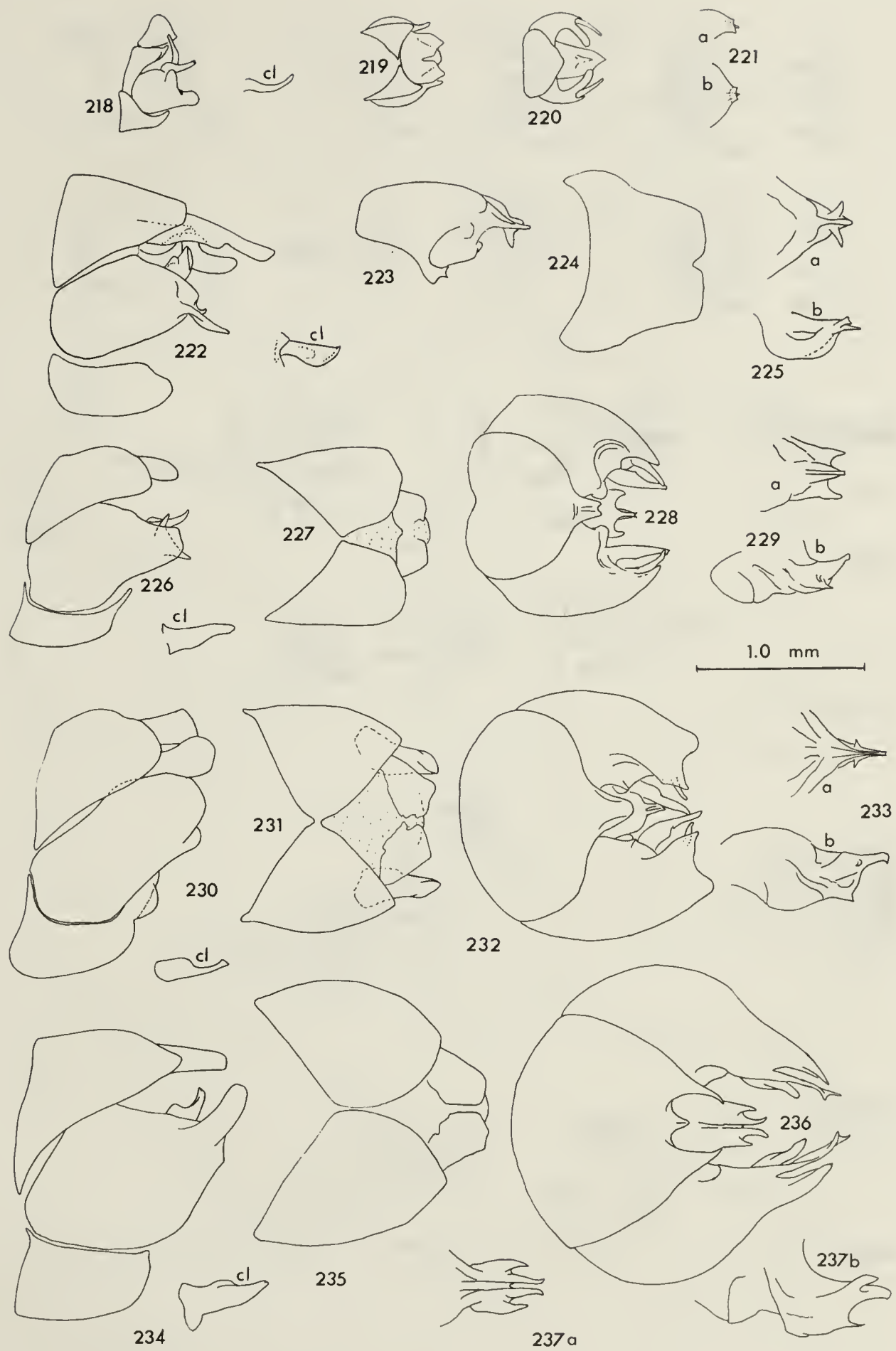




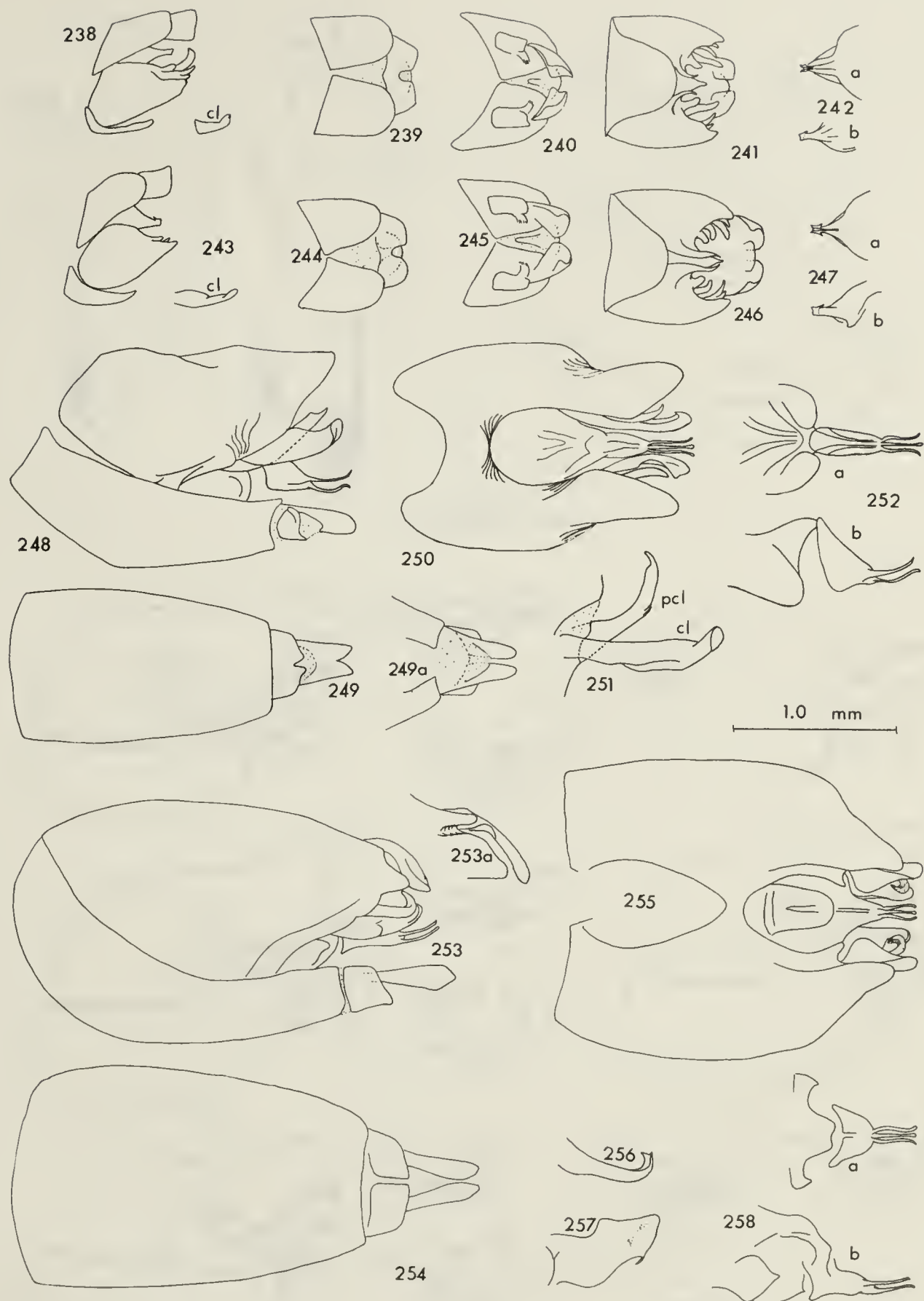






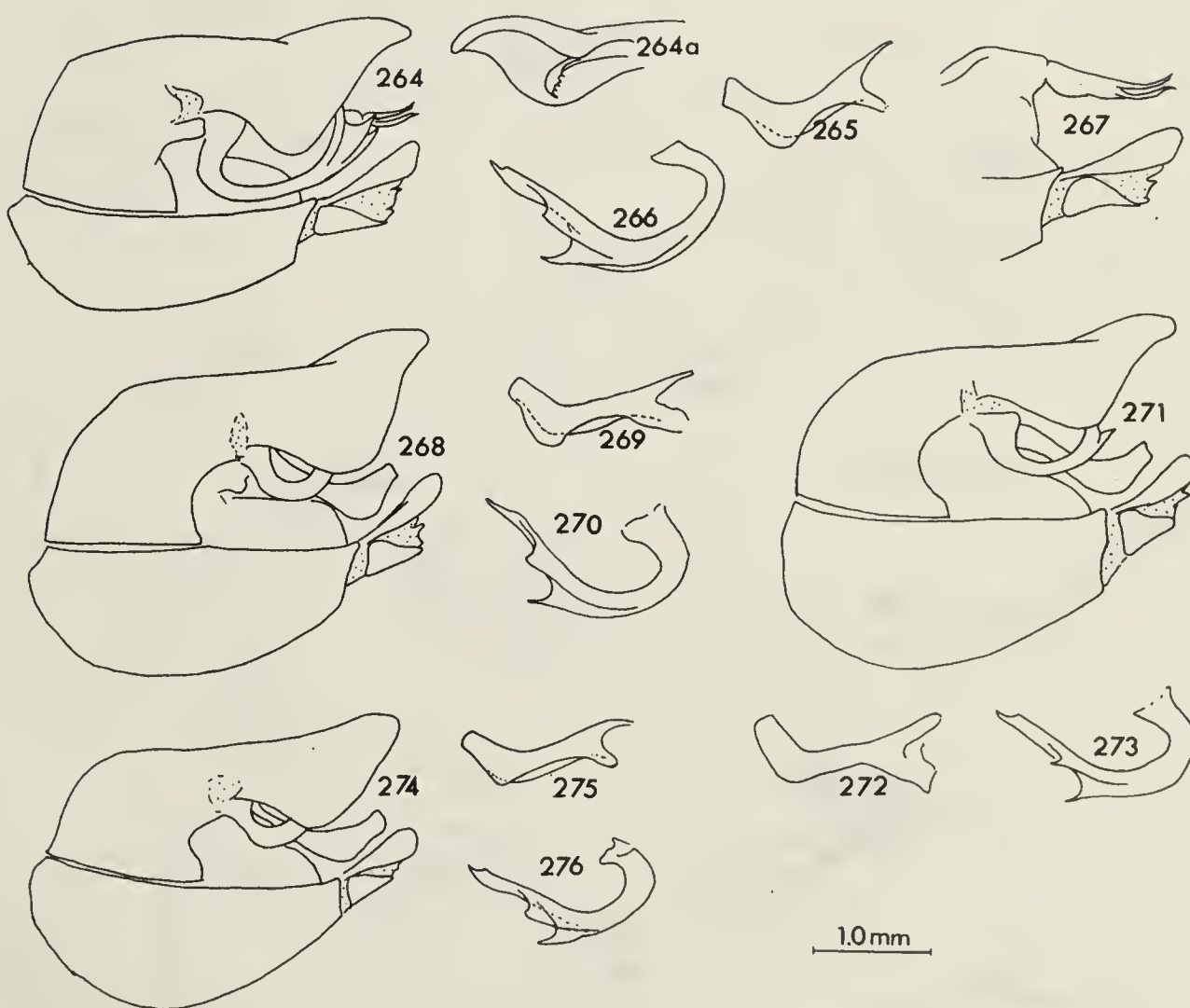
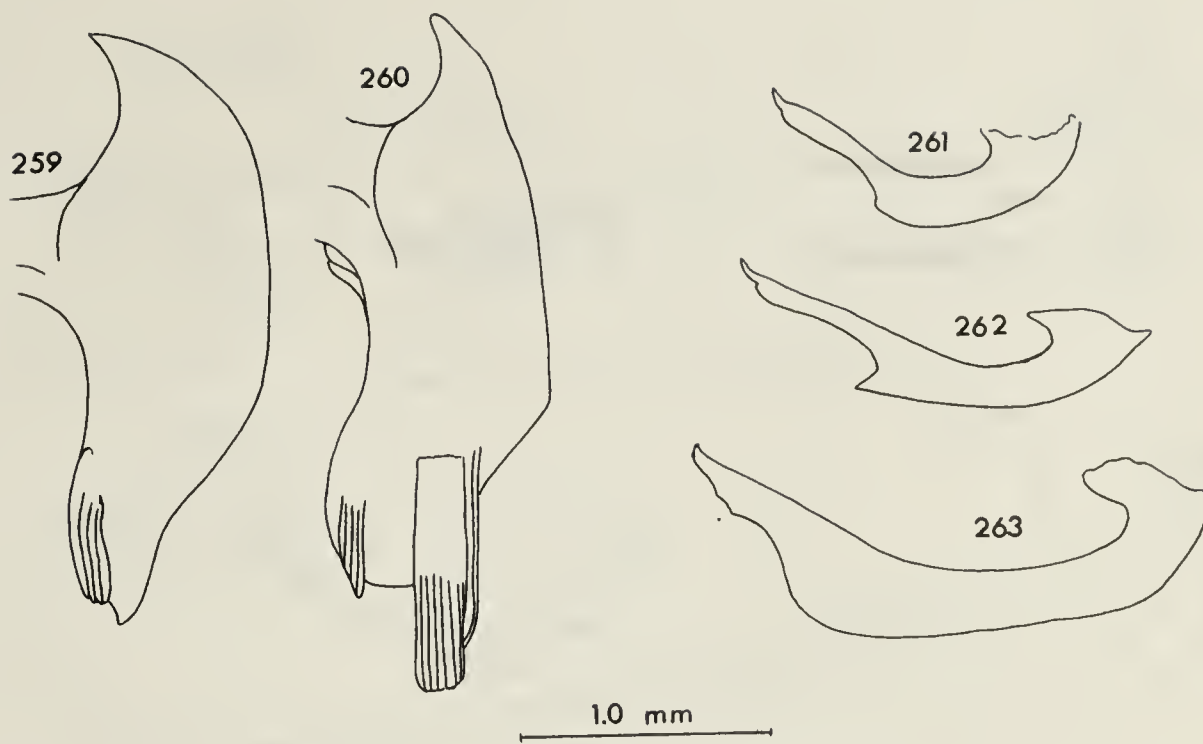




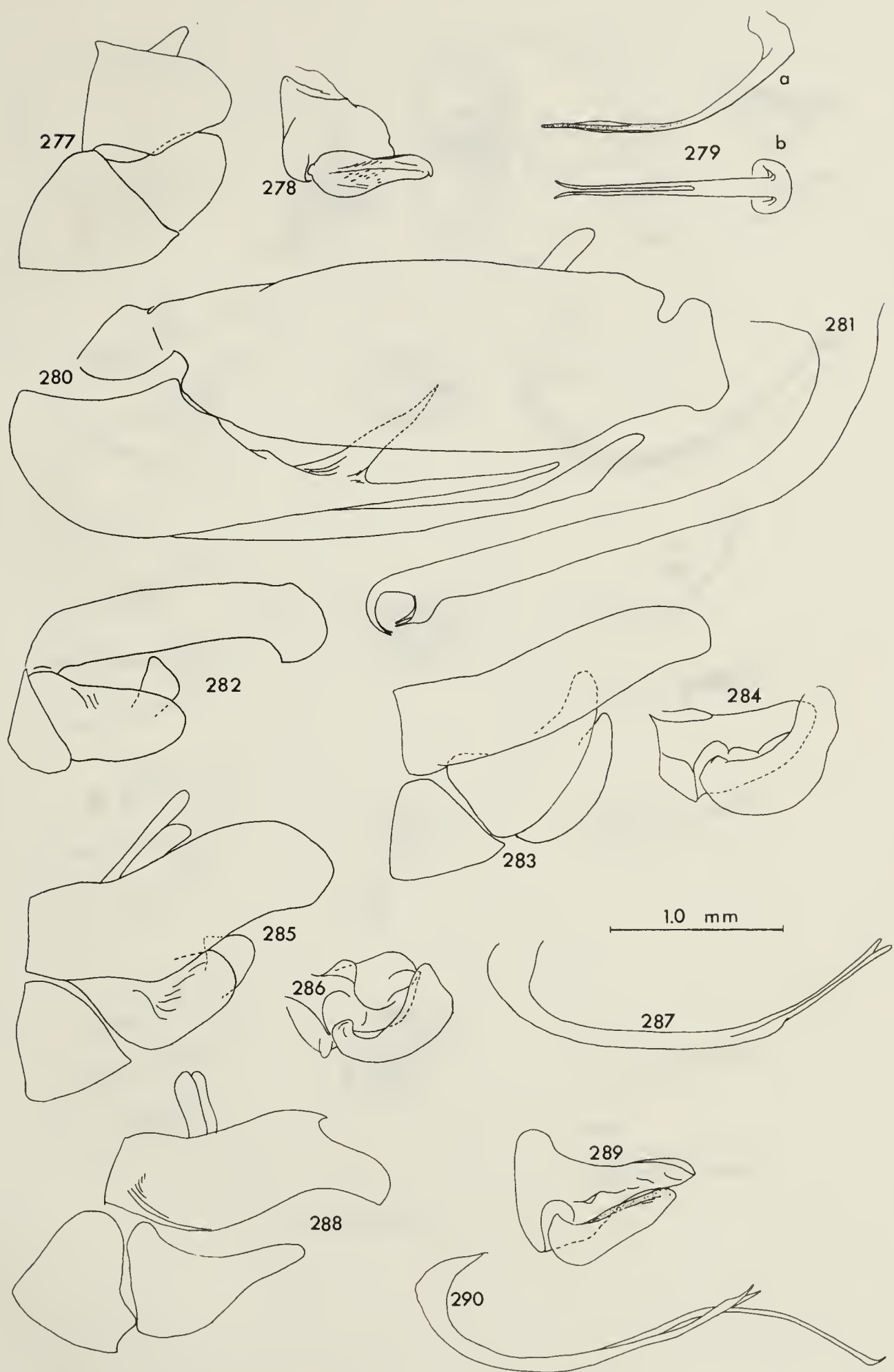






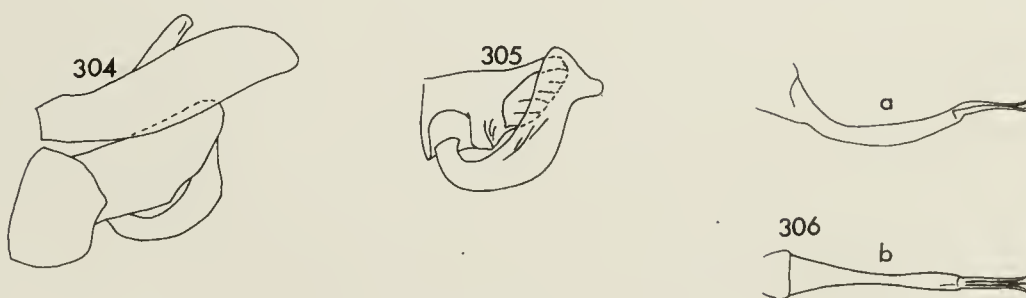
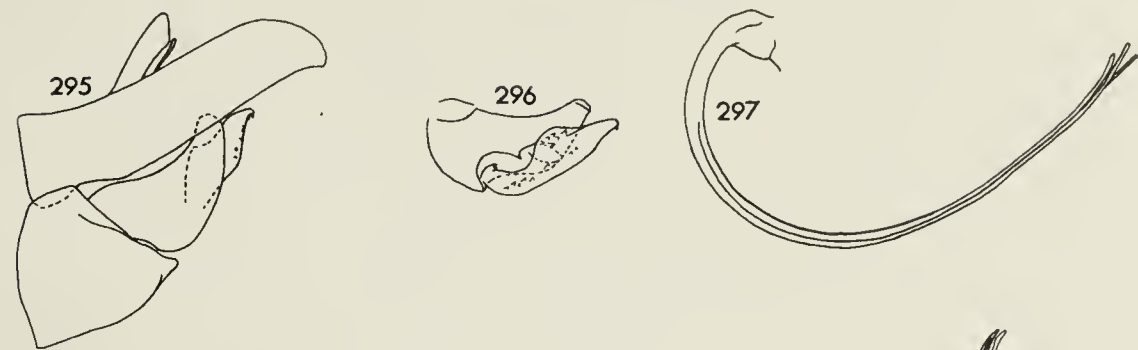
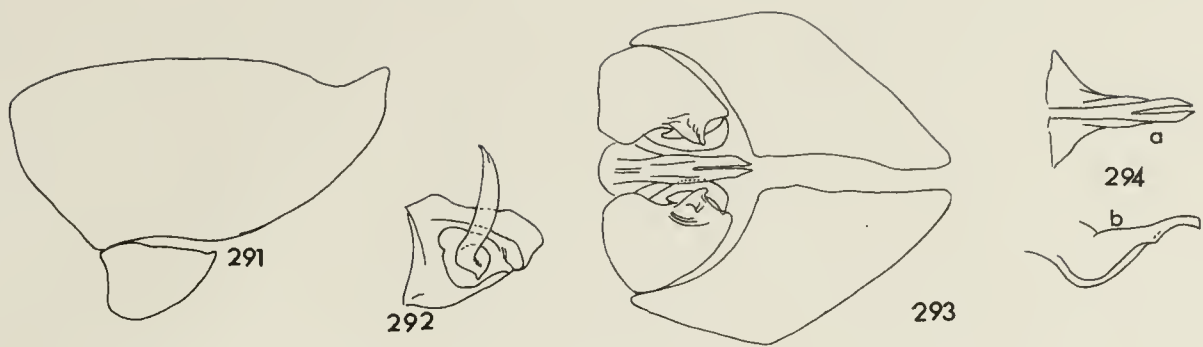












1.0 mm





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